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ABSTRACT

In Australia and elsewhere, four approaches have been used to determine whether stocks of vocational education and training (VET) skills are adequate to meet industry needs. The four methods are as follows: (1) the manpower requirements approach; (2) the international, national, and industry comparisons approach; (3) the labor market analysis approach; and (4) the indicators approach. No single approach is satisfactory. An aggregate measure of the adequacy of VET skill formation has been proposed. The aggregate measure provides two ways of measuring the VET sector and two methods for ensuring genuine value. The aggregate measure entails the following principles: (1) activities contributing to the formation of VET skills must be identified; (2) identified skill formation activities should be valued by their values added; (3) values added should be summed to provide a measure of total value added by the VET sector; and (4) the annual additions to the stock of VET skills could be aggregated to provide a measure of the value of the stock of VET skills each year, and the total value of additions to stocks could complement actual annual additions to stocks. (A discussion of 11 research efforts evaluating the adequacy of VET skill stocks is appended.) (Contains 35 references.) (MN)

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ED 463 458

IS THE STOCK OF VET SKILLS ADEQUATE?

Assessment methodologies

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Editor's note:
The world competitiveness report (IMD International, sometimes with World Economic Forum) was renamed *The world competitiveness year book* in 1995. Although we are referring to years 1994–1998, for simplicity we have used the latter title throughout this publication.

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Executive summary

Whether the stock of vocational education and training (VET) skills is adequate to meet the needs of industry is a question that has interested and perplexed policy-makers for a long time. Four approaches have been used to try to answer the question:

- manpower requirements
- international, national and industry comparisons
- labour market analysis
- indicators

This report considers examples of applications of these approaches and details why they provide less than fully satisfactory answers to the question whether the stock of skills can be regarded as adequate.

The report proposes that an electronically-upgraded indicators approach is likely to prove the most satisfactory option for VET decision-makers.

The report also proposes a method for building on such an approach to provide an aggregate measure of the adequacy of VET skill formation.

Manpower requirements

The manpower requirements approach to assessing the adequacy of stocks of skills attempts to derive skill requirements implicit in national and industry forecasts, to compare these with projected supplies of skilled workers, and to formulate training programs to eliminate the forecast excess demands or supplies of skills.

Three attempts to use the manpower requirements approach to assess the adequacy of the stock of skills are discussed in detail, including the Organisation for Economic Co-operation and Development's (OECD) celebrated Mediterranean Regional Project. Imprecision in forecasting shortages or oversupplies of skills is shown to be important in each of the attempts.

It is concluded that the 'quasi-engineering' notion of manpower requirements does not rest on secure foundations. The manpower requirements approach to bringing about 'skills adequacy' is seen to be ambiguous, and even illusory. In consequence, the importance of ensuring both flexible training systems and labour markets cannot be overestimated if rapid and relevant adjustments are to occur to offset inevitable errors of foresight in the supply of skills.

International, national and industry comparisons

The international, national and industry comparisons approach compares national, State or industry skill profiles with model, target or yardstick profiles and formulates training programs to attain such model, target or yardstick outcomes.

The work of Cullen in work skills and national competitiveness (1997a, 1997b, 1998), is given detailed consideration as an example of how comparative analysis has been applied to assess the adequacy of skills formation in Australia. A group of international comparative studies presented by Ryan (1991) is also considered.

Cullen uses two principal analytical tools: correlations between work skill measures of international competitiveness rankings and frequency distributions of qualifications classified by State and industry to reach conclusions about the adequacy of national, State and industry skill stocks.

Australia's performance in the formation of skills is benchmarked internationally, by State and industry. 'Gaps' which emerge from comparisons between Australian skill stocks and the proposed benchmarks are offered as guiding information for policy-makers. Such a 'gap', benchmarking approach is shown to be unable to provide the necessary guidance, however, most obviously in cases where Australia has 'over-achieved' in comparison with the proposed benchmark. For example, Australia has a higher 'people factor' rank than its overall competitiveness rank, implying that Australia's competitiveness is not presently being constrained by 'people factors' (such as skills) but by other factors.

The lack of strong statistical evidence to support the asserted relationships between education variables and economic performance suggests that the detailed guidance that such studies can provide to VET policy-makers (and work skills providers and consumers) is likely to be small.

For example, after analysing regressions of national competitiveness against national qualification profiles, there does not appear to be any strong reason to support the expansion of any one particular level or type of education, as the effect of the various qualifications on overall competitiveness appears to be quite similar to each other.

The lack of strong statistical evidence supporting relationships between education variables and economic performance indicators does not mean that education variables exert no influence on economic performance. Rather, other factors may be as important, or even more important, and their relative importance may change from time to time. Hence, it is not possible to define an appropriate VET strategy independent of considering the detailed circumstances that apply. This is not done in the rather simple 'comparisons' approach.

Studies presented by Ryan (1991) suggest that the 'fungibility' (i.e., transferability) of experiences and policies from one country to another is critical in determining the relevance of comparative analyses. Unfortunately, the studies reject the notion of 'fungibility' or transferability of policies and practices across countries. If VET policies and practices are 'non-fungible', statistical analyses of international cross-sectional data are of questionable relevance and value.

The practice of simply copying policies and programs from one country to the next is inappropriate. Developing practices for one's own country based on lessons drawn from other countries is what is required. Assessments of the adequacy of stocks of skills can only be made in the context of the interdependence of the stocks of skills with other social and economic factors, including the demand for skills.

Labour market analysis

The labour market analysis approach employs models of markets for skilled labour to forecast future excess supplies and excess demands and to formulate policies to correct such imbalances, if such policies can be identified and implemented.

R B Freeman's classic study, *The overeducated American* (1976), is discussed, together with an important collection of papers on the topic edited by H Metcalfe (1995). It is noted that forecasting the future is difficult in the social sciences because the models used as the basis for forecasts can easily be faulty. A model that is appropriate for one period may omit factors or changes to the social system, and turn out to be inapplicable in another period. Well-established generalisations about markets may not adequately describe the behaviour of some

sub-markets, despite adequately describing the broader market of which they are part. Even with the correct model, forecasts can err because of unexpected events that falsify inferences about the future. Social scientists do not have an enviable record for predicting the future.

The phenomenon of dynamic 'cobweb' adjustments of labour markets to imbalances between supply and demand may lead to inadvertently counter-productive responses by governments —a classic example (in a non-training field) being Australia's red grape 'vine pull' of the 1980s. Grapes that were thought to be in chronic excess supply turned out to face a prolonged and massive market shortage.

While the economic modelling of skilled labour markets can be instructive, it can also lead to wrong policy prescriptions. The development of work skills should be treated as part of a broad process of economic evolution, not as a factor that can lead economic progress on a forced march.

Indicators

The indicators approach looks at indicators of the present and likely future condition of skilled labour markets and forms judgements as to the most appropriate courses of action to be taken to improve expected skilled labour market outcomes. This approach to assessing the adequacy of skill has been the most widely used in the context of Australian VET skills.

In the long run, if left alone, labour markets will adjust, changing relative wages, hours and qualifications required for jobs so as to reduce imbalances in the supplies of and demands for skills of various kinds. However, in the short run, mismatches between the supply and demand for skilled labour can lead to costs for individuals and for the economy. Manpower forecasting has the potential to reduce the costs of these mismatches. Both quantitative and qualitative indicators of skilled labour market imbalances are presented as a basis for forecasting likely trends.

Three Australian studies using the indicators approach are discussed. These support the view that qualitative 'indicator' frameworks for assessing the adequacy of future supplies and demands for skills are preferable to strictly quantitative approaches. Analyses making maximum use of current and historical information made available to knowledgeable policy-makers are likely to lead to the most useful solutions to problems of imbalance between the supply and demand for skills.

One of these studies, *Occupational outlook*, (Department of Employment and Industrial Relations 1987) is regarded by the authors as one of the more sensible and valuable aids to understanding skilled labour markets in Australia. It presents a large range of relevant data clearly and succinctly while not concluding or forecasting too much. The need to disaggregate the data contained in *Occupational outlook* can be addressed by publishing the material it contains in an electronic format.

A way forward

The above review of various approaches to considering the adequacy of the stock of skills indicates that technocratic 'solutions' to meeting the skills needs of nations, States and industries all turn out to be ambiguous and illusory. There appears to be no substitute for sensible people as key decision-makers, faced with appropriate incentives, making informed judgements based on an array of relevant and accurate indicators, to provide options for reform.

Flexibility is also required in the education and training system and in the labour market in order to allow adaptation and adjustment to occur to offset the inevitable errors in investments in skills that result from imperfect foresight.

Further, appropriate solutions do not always lie within the realms of education and training. Therefore, a range of policy options, including options lying outside the training system and the labour market should be considered when attempting to redress mismatches in the market for skilled labour.

It is proposed that the tool most suited to assessing the adequacy of stocks of VET skills would be a highly detailed and upgraded electronic version of *Occupational outlook*. This would present a large variety of indicators of imbalance in the demand and supply of skills needed by enterprises, by linking a series of regularly updated databases.

This presentation platform should be made available to a range of informed people at 'key decision-making points' within a flexible labour market. The centrepiece of such a tool would be an occupational/industry spreadsheet, containing data in time series, in addition to commentary regarding the data and occupations and lists of relevant contacts and references. Australian Standard Classification of Occupations (ASCO) and Australian and New Zealand Standard Industry Classification (ANZSIC) classifications are suggested as the basis of the data to be included in the spreadsheet.

It is noted that, if the approach is to be successfully adopted, industry would be required to contribute to determining which indicators were chosen to represent the skills position in each industry or occupation. Twenty-five relevant indicators including *vacancies, training costs per employee* and *rate of geographical / product market change* are suggested.

An aggregate measure

The VET sector can be measured in one of two ways, consistent with national economic accounting principles:

- by adding the values added by VET
- by adding the incomes received by employees and owners involved in VET

To ensure that skill development is of genuine value to the economy it is necessary to ensure that the users or final consumers of each good are the final arbiters of its value— not the producers or providers. It is necessary, in order to avoid Soviet-style accounting, to ensure that economic production is of genuine value. Two methods for ensuring genuine value are:

- if the product or service has been sold to a willing buyer
- if the product or service has been provided by governments whose performance can be subjected to open scrutiny and free debate

Valid concerns about the Australian VET system include whether decision-making processes are sufficiently responsive to what Australia's enterprises and citizens (consumers) really want. The proposed VET grass roots planning process is expected to ensure the outputs and wants from the VET system are qualitatively matched.

To assess the adequacy of VET skills a four-step calculation is proposed:

1. Activities contributing to the formation of VET skills must be identified.
2. Identified skill formation activities should be valued by their values added.
3. Values added should be summed to provide a measure of total value added by the VET sector.
4. The annual additions to the stock of VET skills could be aggregated to provide a measure of the value of the *stock* of VET skills each year. Total value of additions to stocks could complement actual annual additions to stocks.

When training is distinct from production, the identification of costs is relatively straightforward. However many training and learning activities are learned and taught in the

course of normal production activities. Including informal on-the-job training and learning in aggregate measures of VET skills is consistent with the emphasis on being responsive to enterprise needs.

Value added by the formal (structured) training of VET is relatively straightforward to measure, and is presently identified in the national accounts. Informal (structured and unstructured) training are not explicitly contained in the national accounts. Wage payments associated with employees undertaking informal training should be identified and allocated to enterprises' training accounts rather than their productive accounts.

Enterprises that provide training should be considered to have two activities—a production activity and a training (human capital investment) activity. Resources devoted by an enterprise to investments in training and learning should be counted as value added in training, not as value added in the enterprise's production. Methods are proposed by which on-the-job investments in the skills of employees can be estimated.

How big is the annual VET sector if measured using the proposed methodology? Australian Bureau of Statistics (ABS) figures show that formal training expenditure by enterprises accounts for two per cent of wages and salaries annually. It is assumed that informal training by enterprises also accounts for 1.5 per cent of wages and salaries. In addition to enterprise expenditure ABS data shows government spending on VET is about 0.6 per cent of gross domestic product (GDP) annually. Thus the total size of VET is about 2.35 per cent of GDP which is about double the size of the university sector.

Conclusions

After reviewing various methodologies for assessing the adequacy of VET skills, this paper develops a methodology that attempts to maximise the likelihood that the stock of VET skills being developed will provide skills of value to Australian enterprises. The methodology incorporates grass roots decision-making—considered essential to guarantee quality—and outcomes that can be aggregated to summary measures of value of stocks of skills.

The methodology is consistent with national accounting principles and is capable of providing an aggregate measure of Australia's skills development that can be compared in a consistent way with other countries' skills development, as well as enabling comparison of Australia's performance in skills development with Australia's performance in other forms of investment.

What is proposed is a flexible aid to better, more value-creating, VET decision-making and assessment, one that recognises the futility of attempting to undertake assessments using the technocratic frameworks adopted by the centralised planning frameworks of the past.

Introduction

This report discusses methodologies that have been used to assess the adequacy of vocational education and training (VET) skills and proposes a disaggregated, industry-specific methodology in addition to a macro-level summary measure.

A literature review is undertaken to consider the benefits and problems inherent in the methodologies and data sources used to assess the adequacy of VET skills. A micro-level methodology, which takes account of the conclusions of that review, is subsequently outlined. The principal virtue of the proposed methodology is that it captures industries' skill needs at a level of disaggregation to enable the VET system to tailor its efforts effectively to meet the real needs of enterprises.

Subsequently, the methodology is further developed as a basis for proposing a macro-level summary measure that could be used to monitor the stocks of vocational education and training skills against desired levels. This measure is intended to be an analytical and diagnostic tool and will help determine the extent to which the vocational education and training system is increasing Australia's skill pool to be relevant to Australian industry. This measure has the capacity to show variations between the Australian skill base and that of overseas countries.

Further work will be necessary to address the software and links to databases required to operationalise the methodology and to compute the measure according to the methodology developed.

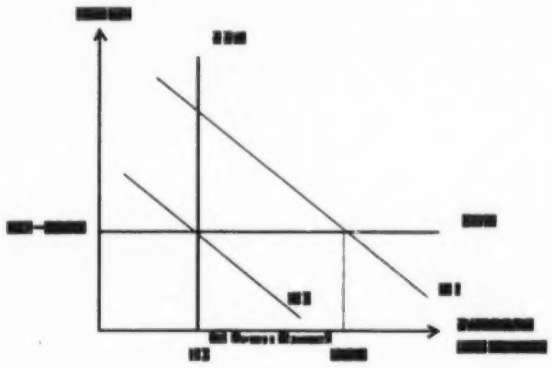
Background

There are two main senses in which to assess the adequacy of the stock of skills in a society. The first of these is whether there are shortages (and/or oversupplies) in the various markets for skilled labour. The second is whether a different stock of skills (in quantity and/or composition) would lead to better economic outcomes in terms of production, employment, wages, and so on. These two perspectives are described in boxes 1 and 2. Each of these ways of assessing the adequacy of skills in a society (and the policy issues they give rise to) is used in the methodologies outlined in this report.

Box 1: Shortages or oversupplies of skilled labour

Let us suppose that at time 0 the labour market for skilled workers is in equilibrium, with E_0 skilled workers being employed at wage rate W_0 (equal to the long run equilibrium wage rate, WLR). This means that an unlimited supply of skilled workers (indicated by the line SLR) can be obtained, in the long run, at this wage rate. Let us suppose that demand for skilled labour increases at current wage rates from demand curve D_0 to demand curve D_1. This creates a short run excess demand for skilled labour. In the diagram, this shortage is labelled 'SR Excess Demand' and is equal to (ELR – E_0). The current stock of skills (SSR = E_0) is not sufficient to allow ELR skilled workers to be employed. In this sense, the stock of VET skills is now inadequate. Looking at the situation over time, it can be argued that the stock of skills is not adequate if a shortage situation such as is depicted in figure 1 is a persistent feature of the skilled labour market. The policy issue is to develop means by which such a situation can be speedily rectified or, even better, can be avoided through pre-emptive action.

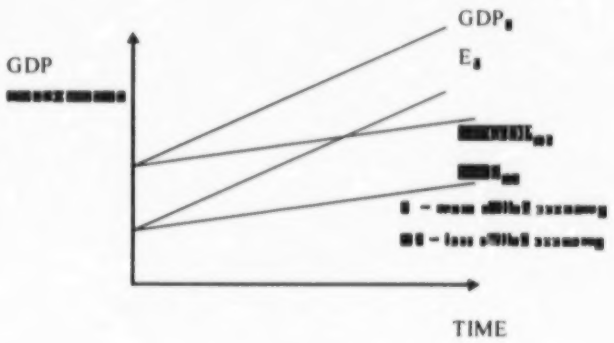
Figure 1: Supply of and demand for skilled workers



Box 2: Improved economic outcomes from a different set of skills

In figure 2, the performance of a more skilled economy (S) is contrasted with the performance of a less skilled economy (US). It can be seen that (as depicted) the less skilled economy has a slower growth of both GDP and of employment than does the more skilled economy. This difference suggests that skill formation in the less skilled economy is inadequate (or less adequate) in quantity, composition or degree than skill formation in the more skilled economy. The policy issue is to develop means of ensuring that the economy operates with a quantity, composition and degree of skill formation that maximises its growth of output and employment.

Figure 2: Skills and macro-economic outcomes



Skills are not the only factor affecting economic performance, of course. Nor can the processes by which skills are formulated be arbitrarily assigned to any institution which may have a training role. The means by which issues of skill adequacy are addressed should pay regard to the broader competitive context in which economies operate, the role that skill formation plays in that context and the real processes by which skills are formed.

A classic study

In considering the question whether the stock of VET skills is adequate to meet the needs of industry in a country, it is useful to start from a theoretical framework that addresses the reasons why firms in some countries achieve greater international success than firms in other countries. While *The world competitiveness year book*, (IMD International, various years) for example, might (or might not) measure international competitiveness adequately, it is important to understand the role that VET skills might play (if any), alongside other factors in determining degrees of competitiveness. A comprehensive framework for this purpose is offered by Michael E Porter in his book, *The competitive advantage of nations* (1990).

Porter argues (p.71) that it is:

> *four broad attributes of a nation that shape the environment in which local firms compete that promote or impede the creation of competitive advantage . . .*
>
> 1. *Factor conditions: the nation's position in factors of production, such as skilled labor or infrastructure, necessary to compete in a given industry*
> 2. *Demand conditions: the nature of home demand for the industry's product or service*
> 3. *Related and supporting industries: the presence or absence in the nation of supplier industries and related industries that are internationally competitive*
> 4. *Firm strategy, structure, and rivalry: the conditions in the nation governing how companies are created, organized, and managed, and the nature of domestic rivalry*

Porter arranges these four attributes in a national 'diamond' whose elements form a mutually reinforcing system. In his view (p.73):

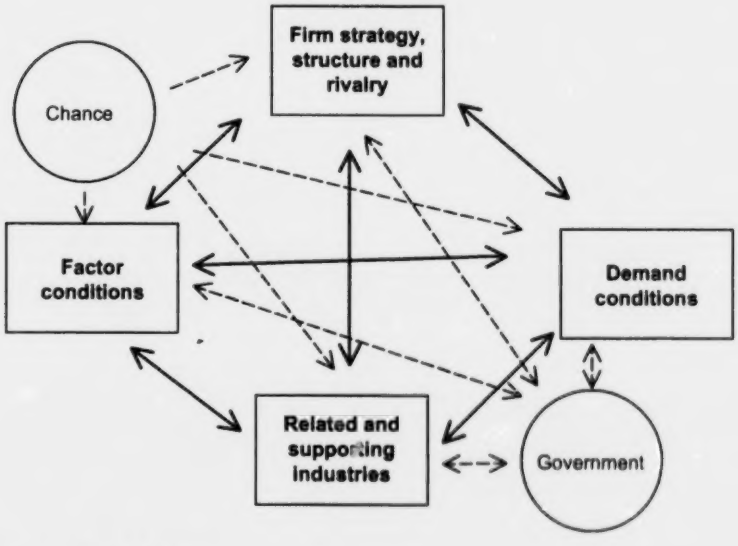
> *Advantages throughout the 'diamond' are necessary for achieving and sustaining competitive success in the knowledge-intensive industries that form the backbone of advanced economies.*

Chance and government also influence the national system (p.73):

> *Government, at all levels, can improve or detract from the national advantage. This role is seen most clearly by examining how policies influence each of the determinants . . . Policies implemented without consideration of how they influence the entire system of determinants are as likely to undermine the national advantage as to enhance it.*

Porter's 'diamond' system of mutually reinforcing determinants of national economic advantage, and the role of chance and government in affecting them, is illustrated in figure 3.

Figure 3: The determinants of national economic advantage



Source: Porter 1990, figure 3.5, p.127.

Since all these determinants play an important and mutually reinforcing role, it might not be effective policy to pursue goals with respect to any one of them in isolation (such as achieving

international 'work skill benchmarks', for example) if this effort turned out to be at the expense of some other attribute of the national, competitive 'diamond'.

Further, specialised factors provide more decisive and sustainable bases for competitive advantage than generalised factors (pp.78–80):

> *Specialized factors involve narrowly skilled personnel, infrastructure with specific properties, knowledge bases in particular fields, and other factors with relevance to a limited range or even to just a single industry. Examples would be a scientific institute with expertise in optics, a port specialized in handling bulk chemicals, a cadre of skilled model makers for automobiles, or a pool of venture capital seeking to fund software companies . . .*
>
> *Specialized factors require more focussed, and often riskier, private and social investment. They depend in many cases on already having a base of generalized factors . . . Specialized factors . . . are necessary for more sophisticated forms of competitive advantage. This makes them integral to innovation . . .*
>
> *Furthermore, a private sector role in factor creation is necessary to attain factor advantage in most industries. Advanced and specialized factors are the most important to competitive advantage, and firms are best positioned to know which of these are necessary to compete in their industries. Government investments in factor creation usually concentrate on more basic and generalized factors.*

Thus, a large amount of detailed, specific information is needed as well as an understanding of other factors involved in sustaining competitive advantage in particular industries. This information is unlikely to be conveyed by a generalised, 'qualification profile' of the workforce employed in each industry. It is far more likely to be conveyed by the behaviour of markets for specialised, industry-specific skills.

As Porter says, while government has an important influence on national competitive advantage (p.128):

> *Government policy will fail if it remains the only source of national competitive advantage. Successful policies work in those industries where underlying determinants of national advantage are present and where government reinforces them. Government . . . can hasten or raise the odds of gaining competitive advantage (and vice versa) but lacks the power to create advantage itself.*

In other words, it is important for government policy toward vocational education and training as well as toward other elements of the national competitive 'diamond', to 'go with the flow', to recognise that nations do not start with an economically clean slate, but with a history and geography that constrain some options, whilst enhancing others. Further, such policy injunctions apply at a level of detail and fluidity that cannot be captured by even the most detailed classifications of central statistical agencies.

As we have noted earlier, Porter (pp.133–5) argues that the adequacy of the supply of any factor of production to meet the needs of industry (such as the supply of a particular VET skill) depends on the role played by the other determinants of national competitive advantage in the 'diamond'. The most important of these other determinants for skill formation and other productive factors is domestic rivalry. As Porter puts it (p.134):

> *Factor creation is perhaps most strongly influenced by domestic rivalry. A number of local competitors in vigorous competition stimulates the rapid development of skilled human resources, related technologies, market-specific knowledge, and specialized infrastructure. Firms invest in factor creation themselves, singly or via trade associations, under pressure not to fall behind. As important, however, is that a group of domestic rivals also triggers special programs in local schools and universities, government-supported technical institutes and training centers, specialized apprenticeship programs, industry-specific trade journals and other information providers, and other types of investment in factors by government and other institutions . . . A group of domestic rivals also stimulates job seekers to invest in gaining specialized skills . . .*

These effects will be most pronounced if the rivals are all located in one city or region. The number of degree programs, databases, and research efforts in and around New York related to Wall Street is a typical example. There are four specialized university research institutes catering to the auto industry in southern Germany. The University of California at Davis, in the heart of California wine country, is another good example. It has become perhaps the world's leading center of wine-making research in close and active interchange with the California wine industry . . .

. . . The presence of a number of rivals not only signals the importance and potential of the industry, causing individuals and institutions to take notice, but also reduces the risk of investing in creating specialized facilities and skills. With a group of rivals, there are a number of potential employers for graduates and several supporters and users of specialized facilities, programs, and knowledge. . .

It is worth noting, again, the emphasis that Porter places on specialisation, industry–education interchange, and the geographical clustering of rival firms. Domestic rivalry gives rise to external economies—economies that accrue beyond the individual firm, but within the group of firms in a locality or nation. Local, detailed knowledge affects the speed with which the accumulation of relevant, productive factors, such as specialised VET skills, takes place. It is clear that judgements over the adequacy of the supply of VET skills (or any other productive factor) depend on detailed and location-specific matters. Such knowledge is likely to be held only by people intimately connected with the markets for the skills in question.

Porter also argues (p.135) that the presence of *related and supporting industries* and the type of particular *demand conditions* faced by an industry affects assessments of the adequacy of skills (or other needed productive factors). Related and supporting industries enlarge the size of the industry clusters using particular specialised factors and encourage investments in the relevant factors and factor-creating mechanisms:

Sometimes, whole new industries spring up to supply specialized infrastructure to such clusters. Such a mutually reinforcing process is occurring in the United States, where the existence of world-class industries in mainframe computers, mini-computers, micro-computers, software and logic circuits has sent public and private institutions scrambling to create software training centers and courses. The resulting pool of skilled human resources, knowledge, scientific centers, and specialized infrastructure is benefiting the whole group of industries and is spilling over to benefit other industries that depend on information technology.

With respect to demand conditions:

Advanced and specialized factors of production grow up to help meet pressing local needs. For example, nations depending heavily on sea transport such as Sweden and Norway have well-developed specialized educational and scientific institutions geared towards oceanography and shipping. In the United States, both government and private investments are substantial in defense-related technologies and skills.

Consistent with his emphasis that only firms can create competitive national industries, Porter believes (pp.620–30) that government policy towards 'factor creation':

should involve industry in determining what factors are created, and encourage firms to play a prominent role in factor creation themselves. The decisive factors are specialized and anticipate the emerging needs of industry. Government cannot pick the right factors or create them very effectively by itself . . .

Competitive advantage is created through a long process of upgrading human skills, investing in products and processes, building clusters, and penetrating foreign markets . . .

Yet a decade is an eternity in politics . . .

Government policy must provide an environment in which any industry can prosper if firms are innovative and achieve high productivity. A diversified economy has room for a range of industries that can provide employment to human resources with different skill and aspirations . . .

[Government] *factor-creating mechanisms are rarely in themselves a source of competitive advantage. Government's direct efforts at factor creation are appropriately in generalized areas, yet the most significant factors for competitive advantage are advanced and specialized and inevitably tied to industries or groups of industries . . .*

Governmental efforts at creating specialized factors run the risk of creating the wrong factors at the wrong time . . .

However:

There is little doubt from our research that education and training are decisive in national competitive advantage. [Those] *industries that were the most competitive were often those where specialized investment in education and training had been unusually great . . .*

Education and training constitute perhaps the single greatest long-term leverage point available to all levels of government in upgrading industry. Improving the general education system is an essential priority of government, and a matter of economic and not just social policy. At the same time, however, the general education system is insufficient to ensure national advantage. As important is setting policies that link the educational system to industry and encourage industry's own efforts at training . . .

[The] *following characteristics of sound educational policy emerge from our research:*

1. *Educational standards are high.*
2. *Teaching is a prestigious and valued profession.*
3. *The majority of students receive education and training with some practical orientation.*
4. *There are respected and high-quality forms of higher education besides the university.*
5. *There is a close connection between educational institutions and employers.*
6. *Firms invest heavily in ongoing in-house training through industry associations or individually.*
7. *Immigration policies allow the movement of personnel with specialized skills.*

Summing up, according to Porter's (1990) *Competitive advantage* perspective, the adequacy of VET skills in Australia is of vital concern to the international competitive position of Australia's industries.

However, this concern can only be addressed through mechanisms that examine specialised and advanced skills at a level of high detail, involving clusters of firms and industries, often concentrated in particular geographical locations (both as demanders and as suppliers of the relevant skills).

Further, it is likely that many of the most relevant specialised and advanced skills can only be acquired by a combination of informal learning on the job and interaction with (public and private sector) research experts in the appropriate fields. The development of such skills does not lead to the award of any customary educational qualification. There is no necessary connection between the supply of specialised, relevant skills and the gaining of formal qualifications.

An effective methodology for assessing the adequacy of VET skills in meeting the needs of Australian industry should pay due regard to these considerations.

The question of whether the stock of skills is adequate in meeting the needs of industry has, of course, been asked for a long time. An analysis of the literature reveals that adequacy of skills can be measured by using one of four techniques:

- manpower requirements
- international, national, and industry comparisons

- labour market analysis
- indicators

The manpower requirements approach attempts to derive the requirements of skilled workers implicit in national or industry production forecasts, to compare these with projected supplies of skilled workers and to formulate training programs to meet forecast excess demands or to eliminate forecast excess supplies.

The international, national and industry comparisons approach compares national, State or industry skill profiles with model, target or yardstick profiles and formulates training programs to achieve such model, target or yardstick outcomes.

The labour market analysis approach employs models of markets for skilled labour to forecast future excess supplies and excess demands and to formulate policies to correct such imbalances, if such policies can be identified and implemented.

The indicator approach looks at indicators of the present and likely future condition of skilled labour markets to form judgements as to the most appropriate courses of action to be taken to improve expected market outcomes.

Examples of the application of these methodologies are presented and discussed in the following chapters.

Manpower requirements

One of the earliest, most strongly supported, most systematic, scientific and technocratic attempts to answer the question whether the stock of skills is adequate to meet the needs of industry was the Organisation for Economic Co-operation and Development's (OECD) Mediterranean Regional Project (MRP) of the 1960s (Parnes 1962; Hollister 1967). The project attempted to plan the development of the education and training system in six countries (Greece, Italy, Portugal, Spain, Turkey and Yugoslavia) on the basis of forecasts of long-term manpower needs, while using a common methodology. In broad terms, the methodology:

- used forecast growth to 1975 in gross domestic product (GDP)
- cross-classified the GDP forecast by industry to yield value-added by industry
- cross-classified value-added in each industry by labour productivity in each industry to yield employment in each industry (aggregated across industries to yield total employment)
- cross-classified employment in each industry by occupational shares to yield occupational employment in each industry (aggregated by occupation across industries to yield total employment by occupation)
- cross-classified employment in each occupation by shares of (highest) qualifications in each occupation (aggregated by qualification across occupations to yield total employment by highest qualification)
- subtracted surviving stocks of (highest) qualifications from the forecasts of employment by highest qualification to yield shortfalls or oversupplies of stocks of qualified people at the target date
- programmed an expansion and/or restructuring of the education and training system (and/or of the national or locational migration program) to achieve the employment (by qualification) structure forecast for the target date
- used target teacher/pupil ratios to estimate the numbers of teachers needed in each branch of the education and training system in order to achieve the 'education plan', together with an estimate of the number of trainee teachers needed each year to graduate sufficient teachers to meet required teacher numbers
- used recurrent and capital spending norms (per student or per extra student) to estimate the recurrent and capital expenditures needed in each branch of the education and training system in order to achieve 'the plan'.

The plans yielded by this 'manpower requirements' approach relied on an extraordinary range of assumptions about the likely future evolution of productivity by industries, occupational structures of different industries, and qualifications' structures of different occupations. While these matters do evolve, and often for reasons that are qualitatively accepted, their precise future course is not at all sufficiently well understood to be able to describe the resulting forecasts (and 'requirements') as 'robustly determined'. On the contrary, the possibility of qualitatively significant error is quite large. For example, as Hollister (1967) notes in his evaluation of the Mediterranean Regional Project (p.72):

> *The results suggest that occupational input coefficients at a given point in time are variable, i.e. that substitution possibilities exist, so that the amount of various types of labour demanded can be*

adjusted in response to changes in relative supply . . . Substitution . . . also . . . indicates the possibility of a range of choice among alternative patterns of manpower inputs which would be consistent with a given set of economic output targets.

Hollister sums up with the assessment that (p.80):

. . . a fairly wide range of uncertainty remains with respect to specific long-term requirements . . . If one is somewhat uncertain about the nature of requirements, flexibility in the system and curricula which promote flexibility in the graduates should perhaps be emphasised.

A particular weakness of the manpower requirements approach identified by Hollister was the basis of the qualification profile of each occupation. Was this profile technologically determined, or did it also reflect the availability of supplies of people with different qualifications? If the latter is the case (as it surely must be to some degree), then the extent to which projections of manpower stocks can be said to be 'required' becomes highly problematic. For example (p.72):

It was shown that for one of the MRP countries, estimated changes in the occupational–educational relationships were of over-riding importance in the determination of educational requirements.

In other words, rising qualification requirements in occupations may largely reflect a creeping credentialism in the labour market. For example, a university degree may not be technically necessary for a person to be employed as a waitress or bartender, but because of the nature of competition within the labour market, it emerges as a requirement for such jobs.

Furthermore, it was immediately recognised that education and training serve other than purely economic purposes. This view stresses the returns to investments in values that accrue to individuals and societies from education, returns that cannot be calculated in 'manpower requirements' terms—such as an informed citizenry, equality of opportunity, a heightened capacity to consider cultural and philosophical issues about human existence and purpose, social ethics, and so on. The quality of the educational processes involved and their consequences for the evolution of qualification structures of occupations, occupational structures of industries, productivity growth and growth in the economy itself, also need to be included in the education and 'manpower requirements' plans.

Clearly, any departure from a strict 'manpower requirements' basis to educational outcomes must logically carry adjustment implications for the labour market, compared with the forecast situation from which the 'manpower requirements' were derived. In other words, the 'quasi-engineering' notion of manpower 'requirements' rests on much less than secure foundations.

Not only does uncertainty exist about the magnitudes of the parameters that need to be known in order to calculate 'manpower requirements' in any given state of the labour market, but these parameters are likely to be different in different states of the labour market. The parameters are also likely to differ in different situations of social and cultural attitude and policy towards education and training. For example, an economy with an arbitration commission governing its labour market is likely to be characterised by a different set of economic growth, productivity, occupational composition and educational qualification parameters than one characterised by unregulated, decentralised negotiations between employees and firms. Further, a society with a minimum school leaving age of 16, no technical high schools, free tertiary education and a curriculum that emphasises maths, science and languages is likely to be characterised by a different set of economic growth, productivity, occupational composition and educational qualification parameters than one with no minimum school leaving age, privately funded tertiary education and restrictions on the participation of females in education and training.

Small changes in the relevant parameters can yield major differences in economic and social outcomes over the lengthy periods of time for which such plans are normally developed. Cost-benefit (accompanied by sensitivity) analyses of the economic and social outcomes resulting from different education and training plans implemented in different states of the

labour market can be undertaken in order to decide the labour market reforms and education and training plans which best meet the society's economic and social goals. People's judgements about what constitutes 'best' are affected by their values. Hence, there is no particular reason why everyone should prefer the same reform agenda and education and training plan.

An Australian application of the Mediterranean Regional Project's methodology to forecasting manpower requirements for computer programmers and systems analysts in Australia was undertaken in 1984–85 by the National Institute of Labour Studies (NILS) for IBM Australia Ltd, the National Training Council and the South Australian Department of Labour (Kriegler et al. 1986). Four plausible demand scenarios for the year 2001 were assembled using Australian Bureau of Statistics (ABS) data reflecting high and low economic growth, significant and minimal structural change in the industry mix, and either a significant or minimal increase in the share of computer-related occupations.

On the basis of these scenarios, the demand for computer programmers and systems analysts in 2001 was estimated to lie between 22 700 and 52 100 (from a base of 19 300 in 1983). The supply of computer programmers and systems analysts in 2001 (on the basis of four plausible supply scenarios) was estimated to lie between 48 000 and 76 900. Nearly all of the projected outcomes showed significant *oversupply* (within a range from an oversupply of 54 200 to a shortage of 4000) (Kriegler et al., pp.45–59).

However, using more recent NILS survey data, and the growth rates of computing staff shown in those data, plausible alternative manpower demand scenarios for 2001 were constructed indicating the potential for a substantial *shortage* (up to 286 400 in 2001) if present high growth trends in demand and supply were to persist, or for a substantial *oversupply* (up to 23 900 in 2001) if demand growth were to taper off, even if supply growth were to taper off with it (Kriegler et al. pp.59–65). In other words (p.65):

> *If present growth trends were to persist (the high demand/high supply growth scenario), substantial and increasing shortages of computer personnel would be encountered in the 1990s. If, however, demand growth were to taper off, even if supply growth were to taper off with it, significant and increasing oversupplies would be encountered.*

These data are presented in table 1. The more extreme outcomes in the table have been disregarded as being implausible; for example, because the outcomes would result from fast growth in demand and slow growth in supply, or *vice versa*.

Table 1: Projected shortages (+) and oversupplies (-) in 2001 under different combinations of supply and demand scenarios for computer programmers and systems analysis, Australia

	Supply scenarios			
Demand scenarios	i	ii	iii	iv
i	-47 800	-39 900	-21 900	-19 000
ii	-52 700	-44 800	-26 800	-23 900
iii	53 900	61 800	79 800	82 700
iv	156 500	164 400	182 400	185 300
v	286 400	294 300	312 300	315 200
vi	28 000	35 900	53 900	56 800
vii	11 600	123 900	141 900	144 800
viii	224 400	232 300	250 300	253 200

Source: Kriegler et al. 1986, table 6.17(b), p.64.

As Kriegler et al. note (p.65):

> *. . . training policy makers are faced with a dilemma—whether to bet on the shortage or oversupply scenario developing. Substantial errors could be made if the wrong choice were made—if supplies are geared up to eliminate a prospective shortage which does not eventuate, the oversupply of computer-related staff will have been exacerbated compared with what it would otherwise have been. On the other hand, if supplies are restrained out of fears of an oversupply resulting from a tapering-off of demand growth, and demand growth does not taper off, a large shortage will have been made substantially worse.*
>
> *In this situation, a premium must be paid to strategies which enhance flexibility of supply response to emerging demand patterns. The high expected costs from inevitable forecasting errors can be reduced by making the training system more responsive and flexible.*

A further illustration of the manpower requirements approach to assessing the adequacy of skill stocks is a recent report by NCVER (NSW) and Tourism Potential Pty Ltd (1996), *A methodology for occupational analysis for ITABs.*

The primary aim of this project was to develop a methodology that industry training advisory bodies (ITABs) could use for 'indicative', *additional* demand and supply analysis of occupations generally. The analysis was undertaken for six 4-digit Australian Standard Classification of Occupations (ASCO) job classifications in New South Wales.

The methodology relies on four-year *additional* occupational demand and supply projections revised on the basis of industry consultations.

Additional occupational demand is taken to be the sum of net occupational growth (based on forecasts of occupational employment growth produced by the Centre of Policy Studies at Monash University) plus net occupational separations ('replacement'). Replacement demand was found generally to be more significant than growth demand.

Additional occupational supply is taken to be the sum of projected graduates from training institutions plus projected net migration plus projected additions to the number of persons classified as unemployed in the occupation. The unemployment component generally made a trivial contribution to total supply.

The projections showed significant cumulative five-year imbalances ranging from significant excess demand (travel stewards and hairdressers) to significant excess supply (managing supervisors in hospitality and Japanese-speaking tour guides). In the case of cooks, either excess supply or excess demands were projected as possible.

No 'adaptive' response to these imbalances was factored into the behaviour of these occupational labour markets—excess supplies or excess demands simply continued to increase year by year. This does not seem to be very realistic. For example, in 1996, 10 100 new Japanese-speaking tour guides were projected while only an extra 750 jobs were expected for them. By 2000, annual extra supplies of Japanese-speaking tour guides were expected to increase to 12 600, while extra demand was expected to rise only to 1065.

Further, a major problem was encountered matching the *quality* of supplies and demands in each occupation. There are very many 'unqualified' persons working in virtually every occupation. The reason for this is that the relevant skills can be learned in a variety of ways, including by on-the-job learning which does not result in formal qualifications. Leaving aside Japanese-speaking tour guides, and with the exception of hairdressers, entry to which is State-regulated, more than half of the extra demand each year was projected to be for 'unqualified' persons, whereas the extra supply was largely as 'qualified' persons.

The authors of the NCVER-Tourism Potential report very sensibly saw that there were major problems with the methodology they had developed, notwithstanding its apparently scientific, engineering-style basis. They commented (p.viii):

> *First and foremost, these tables by themselves do not definitively answer the question: is a projected shortage or surplus likely* [in] *1996–2000 in these occupations?*
>
> *The answer to that question will only come from injection of more extensive 'reality checking' of the labour market situation (current and prospective) than was possible or required for this project.*

We agree with the authors' conclusion that the only really sensible basis for making the required judgements is 'reality checking' of the labour market situation (current and prospective).

Summing up, the 'manpower requirements' approach, turns out to be ambiguous and even illusory as a methodology for assessing the adequacy of the stock of VET skills. This is why so many attempts using this approach have failed. Reality points to the value of flexibility, not only in the education and training system, but in the labour market itself, allowing adaptation and adjustment to occur to ameliorate the effects of the inevitable errors in investments in skills resulting from inevitably imperfect foresight.

International, national and industry comparisons

The international, national and industry comparisons approach compares national, State or industry skill profiles with model, target or yardstick profiles and formulates training programs to attain such model, target or yardstick outcomes.

An official report

R B Cullen's recent Australian reports on workskills and national competitiveness (Cullen 1997a, 1997b, 1998) provide a classic example of the 'comparisons' approach to assessing the adequacy of stocks of skills. Cullen compares Australian national, State and industry skill profiles with model, target or yardstick profiles in order to reach conclusions about the adequacy of national, State and industry stocks of skills.

Two principal analytical tools are used:

- correlations between work skills measures of various kinds and international competitiveness rankings issued by IMD International (sometimes with the World Economic Forum) as *The world competitiveness year book* (1994–98)
- frequency distributions of qualifications classified variously by country, State and industry

Cullen uses both of these tools to benchmark Australian performance in the formation of work skills, either internationally, or by State or by industry. It is argued that these benchmarks—'gaps' or deviations from some yardstick or other—provide guidance to VET policy-makers on what actions should be taken.

The essential idea in such 'gap' analysis is that countries, States or industries that are 'below average' should raise their game. This begs the question, of course, of why some countries, States or industries are 'below average' on some characteristics. Are they above average on others? Is it not a corollary of variety and difference in the world that some observations of a variable or characteristic will fall below the mean and others will fall above it? What value is to be attached to trying to be 'average', starting from a position below average? What about those above average?

What starts out looking like a clear and invitingly simple formula turns out, after further consideration, to be anything but clear and simple.

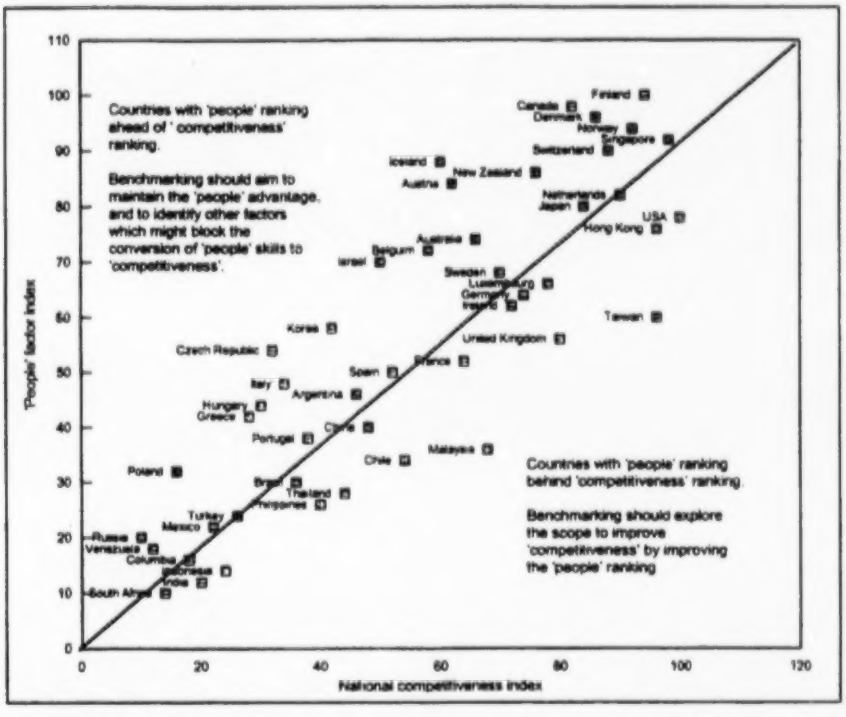
Consider, first, Cullen's 'gap' benchmarking of Australia by comparison with other countries using data from the OECD and from *The world competitiveness year book*.

The world competitiveness year book provides internationally comparable data (and corresponding international ranks) for 46 countries. Eight factors of competitiveness are identified: domestic economic strength, internationalisation, government, finance, infrastructure, management, science and technology, and people. The scores (and ranks) within each factor result from weighted averages of ranks based on scores on over 300 items.

Using data from *The world competitiveness year book 1997*, Cullen (1997b) develops a number of scatter diagrams which relate countries' national competitiveness to various measures (including OECD measures) of their skill levels. One typical such scatter diagram (Cullen,

1997b, p.10) relates each country's world competitiveness rank to their 'people' factor rank. This scatter diagram is reproduced below as figure 4.

Figure 4: The 'people' factor and competitiveness



Note: Rankings for overall 'competitiveness' and for the 'people' factor to an index 1–100 (Index = [51-Rank]/50*100).

Analysis: Performance Management Solutions, 1997.

Source: Rankings from *The World Competitive Yearbook 1997*, IMD 1997.

Cullen comments (p.9):

> *If it is assumed that a high 'people' ranking is one of the factors which determines overall competitiveness, the difference between the 'competitiveness' ranking and the 'people' factor ranking can be used to identify countries where the 'people' factor may be a constraint to 'competitiveness' and other countries where the 'people' factor may drive improvements in 'competitiveness'. Australia is identified as a country in the latter group. This suggests the possibility that blockages in the process which translates 'people' strengths to 'competitiveness' need to be explored as part of any improvement process.*

Thus, the implicit benchmarking rule in this comparative analysis is to regard a country's overall competitiveness rank as its 'norm', and to adopt measures to achieve that norm whenever the country's 'people' factor ranking is below that norm. But when the 'people' factor ranking (as in Australia's case) is *above* its overall competitiveness norm, what policy should be adopted? On the basis of the comparative methodology used, Australia is clearly a competitive 'overachiever' on the 'people' factor.

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On the face of it, in an international 'benchmarking' exercise such as this, it would appear that Australia should look to improving its competitive laurels more in *other* areas affecting its competitiveness—like 'domestic economic strength', 'internationalisation' and 'science and technology'. In each of these areas Australia is *less* internationally competitive than its overall competitiveness rank. This would imply a redirection of resources and effort away from 'people' factor variables, including education and training variables, towards R&D support, for example. Cullen does not advocate such a redirection of resources and effort. Instead, he supposes that there may be 'blockages in the process which translates "people" strengths to "competitiveness" that need to be explored'.

Unfortunately, such argument by *ad hoc* hypothesis severely weakens the relevance of 'gap' benchmarking in the first place. If unacceptable departures from the overall competitiveness 'norm' can be explained away by *ad hoc* suppositions, the benchmarking exercise reduces to a debate about the plausibility of reasons that might explain departures of countries' 'people' factor ranks from their overall competitiveness ranks, rather than providing solid grounds on which to base action.

The most severe example of the problems that can emerge from 'gap' benchmarking arises in the case of Taiwan (Cullen 1997b, p.11), which registers a *negative* gap relative to its overall competitiveness with respect to *every* competitiveness factor. Such a result implies that, in Taiwan's case, *every* competitiveness factor operates as a *restraint* on Taiwan's overall competitiveness! This seems to be logically impossible, casting doubt over the straightforwardness with which the results of such benchmarking procedures can be interpreted.

The world competitiveness year book provides actual competitiveness *scores* (as well as *ranks*) for items and factors, as well as for overall competitiveness. Differences between the scores are often quite small. It is possible for a country to alter its *rank* on a factor, or overall, as a result of a quite small change in *score*. The overall competitiveness score for the United States of America (rank 1) was 100.00, for Singapore (rank 2) 84.25, and for Hong Kong (rank 3) 69.33. But after that, the competitiveness score for Japan (rank 18) was 53.66, while the competitiveness score for Switzerland (rank 7) was 63.57. In fact, after the first two countries (USA and Singapore), a mass of some 25 countries of broadly comparable competitiveness follows, from Hong Kong to Spain, with Australia about in the middle of this pack of largely European and East Asian countries. There is little of real significance about the changes in competitiveness to be attached to countries within this group that might shift up or down by one or two (or probably even more) *ranks*.

In consequence, there is nothing significant to be made of the variation in Australia's overall competitiveness rank from 16 in 1994 to 15 in 1998 (via 21 in 1996 and 18 in 1997). There appears to be no correlation, furthermore, between these movements in overall competitiveness rank and changes in Australia's 'people' factor rank.

Cullen (1997b, p.22 and appendix, p.76) undertakes a multiple regression of OECD countries' world competitiveness ranks against their qualification profiles ranks, yielding regression coefficients of 0.46 for 'post-compulsory and higher', 0.37 for 'post-secondary and higher', and 0.06 for 'degree'. The intrinsic meaning of such coefficients is that a movement upwards of one rank in the OECD 'post-compulsory and higher' league table is associated, on average, with a movement upwards of 0.46 of a rank in the OECD overall competitiveness league table; a movement upwards of one rank in the OECD 'post-secondary and higher' league table is associated with a movement upwards of 0.37 of a rank in the OECD overall competitiveness league table; and a movement upwards of one rank in the OECD 'degree' league table is associated with a movement upwards of 0.06 of a rank in the OECD overall competitiveness scale. Cullen takes this ordering of regression coefficients to mean (p.77) that 'the "post-compulsory" level has the strongest overall relationship with country competitiveness'and (p.23) that the 'hierarchical ordering of the qualification–competitiveness weighting suggests that linkages with competitiveness may also be hierarchical'.

However, these qualification variables are constructed in such a fashion that people classified as holding lower level qualifications also include those with higher level qualifications. Hence, the effects attributed to the lower level qualifications in the regression analyses also include the effects of higher level qualifications. To properly assess whether the effects of the different levels of qualification on competitiveness are 'hierarchical', the effects need to be isolated to each level, not muddied by the effects of mixtures of levels.

If one assumes (as appears to be approximately correct for OECD countries, on average) that 70 per cent of people with 'post-compulsory and higher' qualifications do *not* go on to acquire 'post-secondary' or 'degree' qualifications, then 70 per cent of the impact on overall competitiveness of people gaining 'post-compulsory' qualifications can be attributed to people who did *not* continue to a higher qualification. The impact on overall competitiveness of people for whom 'post-compulsory' was their *highest* qualification is *0.324* [derived as—(0.46 x 0.7 = 0.324)]. This means that a movement of one rank upwards in the OECD '*highest* qualification is post-compulsory' league table is associated, on average, with a movement upwards of 0.324 of a rank in the OECD overall competitiveness scale.

Similarly, if one assumes (as appears again to be roughly correct for OECD countries, on average) that the 30 per cent of people with 'post-compulsory and higher' qualifications who *did* continue to a higher qualification are distributed 15 per cent to 'post-secondary without degree' and 15 per cent to 'degree'; and that half the people with 'post-secondary and *higher*' qualifications have degrees and half do not, a rough estimate can be made of the impact on overall competitiveness of people for whom 'post-secondary without degree' was their *highest* qualification level as *0.254* [derived as—(0.46 x 0.15) + (0.37 x 0.5)]. This means that a movement of one rank upwards in the OECD '*highest* qualification is post-secondary' league table is associated, on average, with a movement upwards of 0.254 of a rank in the OECD overall competitiveness league table.

Similarly, the impact on overall competitiveness of people for whom 'degree' was their *highest* qualification can be estimated roughly as *0.314* [derived as— (0.46 x 0.15) + (0.37 x 0.5) + 0.06]. This means that a movement of one rank upwards in the OECD '*highest* qualification is post-secondary' league table is associated, on average, with a movement upwards of 0.314 of a rank in the OECD overall competitiveness league table.

Therefore, the effects of these three *highest* qualifications on overall competitiveness are quite similar to each other. Contrary to what Cullen suggests, on the evidence presented there is no particularly strong reason to support the expansion of any particular level of education, if one is interested in improving a country's international competitiveness.

Third, as is typical of such studies based on international comparisons, Cullen (p.77)

> *assumes that qualifications are an indicator of the work skills which are developed when a person with qualifications enters employment and develops more specific skills . . .*
>
> *Links between qualifications and work skills are complex, and appear to be more effective in some countries' education and training systems than others. When qualifications are used as a measure of work skills, they are also assumed to measure associated training, much of which does not lead to a formal qualification. This may explain the importance of general, as well as vocational, qualifications suggested by this analysis . . .*

No evidence is presented to test the validity of the assumption that qualifications are a good indicator of work skills.

This problem becomes even more troublesome in the discussion of 'internal benchmarks' in Cullen's third report (1998, p.i). On the one hand:

> *The qualification profile gaps identified by this analysis suggest that there is scope to improve the work skills and competitiveness of particular industries.*

But, on the other:

> *The analysis is diagnostic in focus and is intended to identify issues which might benefit from further examination, rather than to prescribe gaps to be closed or to presume that closing profile gaps will automatically strengthen work skills. Further analysis is necessary to address industry and State differences.*

In fact, qualification profiles are used throughout the reports as though they are synonymous with work skills, notwithstanding that such an assumption is unlikely to hold for those work skills which are of greatest significance for national competitive advantage. As previously discussed, Michael Porter has noted, it is likely that many of the most relevant specialised and advanced skills can only be acquired by a combination of informal learning on the job and interaction with (public and private sector) research experts in the relevant fields, not leading to the award of any customary educational qualification.

A positive association between economic outcomes and education, training, skill, and similar investments in human productive capability, has, of course, been established in a general way for a long time. But it has proven very difficult to pin this relationship down robustly in specifics. For example, Cullen (1998, p.11) cites Patrinos (n.d) as saying:

> *. . . It is now generally recognised that education contributes to economic growth but that it is very difficult to identify and measure the precise contribution of education relative to other factors.*

Cullen adds that:

> *A number of analysts report that they have searched for such a relationship* [between education and economic growth] *unsuccessfully. Where they have found relationships, the results have tended to be weak and volatile over time.*

This is true not only of the relationship between educational variables and economic growth associated with the cross-country regression analysis used by Cullen and others for international 'gap' benchmarking, but also between economic growth and other popular candidate 'causal' variables like fiscal policy, monetary policy, infrastructure spending, competition policy, trade policy, and political stability.

For example, in a study cited by Cullen (1998, p.i), Levine and Renelt (1992, pp.942 & 949) review the

> *vast literature that uses cross-country regressions to search for empirical linkages between long-run growth rates and a variety of economic policy, political, and institutional indicators . . . Given that over 50 variables have been found to be significantly correlated with growth in at least one regression, readers may be uncertain as to the confidence they should place in the findings of any one study . . . We find that only a few findings can withstand slight alterations in the list of explanatory variables . . . almost all results* [from existing studies] *are fragile* [to small changes in the conditioning information set].
>
> *More fundamentally,* [our results] *illustrate that it is very difficult to isolate a strong empirical relationship between any particular macro-economic policy indicator and long-run growth.*

The authors explicitly included primary and secondary school enrolment variables in their assessment.

The instability implicit in such relationships is essentially illustrated by the rapid change in international competitiveness rankings of several countries in *The world competitiveness year book*—such as Finland, Norway, Canada and Ireland, on the one hand (vastly improved from 1994 to 1998), and Germany, Sweden, Japan, Austria and France, on the other (significantly worsened over the same period). It is inconceivable that these rapid shifts could be due to 'people' factor or work skill changes. It is much more probable that they are due to the effects of powerful volatile forces impacting on the short-run economic competitiveness of nations.

The lack of statistical robustness in relationships between education variables and economic performance indicators does not mean that it is unimportant for economic performance whether the stock of VET skills is adequate or not. What it means is that this is a difficult question to answer *independently of its context*. Other factors may be as important, or even more important, and their importance may change from time to time relative to the adequacy of the stock of VET skills. Similarly, some skills may be more important than others, and their relative importance may change from time to time.

Qualifications 'gap' benchmarking is reminiscent of the industrial 'gap' benchmarking pursued by PA Consulting for the Dunstan government in South Australia in 1971–72. On the basis of a comparison of South Australia's industrial profile with Australia's industrial profile, PA Consulting identified nine industry 'gaps' in the South Australian industrial scene, that is South Australian deviations from the 'average' for Australia. The industries included rubber goods, knitwear and swimwear. Approaches to local businesses to fill these gaps were not as successful as Premier Dunstan had hoped, because, it was claimed, of 'a lack of entrepreneurial skills in the local business community' (Stutchbury 1986, pp.87–88 cited in South Australian Development Council 1996, p.21).

An alternative explanation, of course, is that there were good reasons why such 'gaps' existed in the South Australian industrial scene: they were consistent with the pattern of South Australia's competitive advantage. Benchmarking South Australia's industrial profile against the average for Australia as a whole simply does not make much sense as an approach to understanding what industrial opportunities exist in South Australia. Similarly, benchmarking qualifications against the average of countries in *The world competitiveness year book* or in the OECD, against the States of Australia or against Australian industries does not make much sense as an approach to understanding the needs and opportunities for improving the adequacy of VET skills in Australia.

One must conclude that the analytical bases for the sort of comparative benchmarking studies of qualifications undertaken by Cullen and others are tenuous. The value of the guidance that such studies can provide to VET policy-makers (and to work skills providers and consumers) is likely to be small.

A further illustration of the comparisons approach to assessing the adequacy of the stock of VET skills is provided by Ryan (ed. 1991), in *International comparisons of vocational education and training for intermediate skills*, 1991.

The papers in this volume were contributions to a seminar at the University of Manchester in 1989 on craft and technical skills in Britain at a time when Britain was said to be suffering 'the most pronounced underproduction'. As Ryan notes (p.3), these skills are also characterised by being both costly and transferable. In consequence, intermediate skills:

> *are the ones for which market failure is liable to be most serious. Employer provision of training is discouraged by a range of informational, contractual and organizational difficulties; employee self-sponsorship, by those of finance, insurance and attitude. Such obstacles are potentially general, but . . .* [the] *problem is particularly serious in Britain . . .*
>
> *The resulting long-term economic damage has been indicated at sectoral level by the NIESR* [National Institute of Economic and Social Research] *research . . .*

The principal issue to emerge from the seminar was doubt about the 'fungibility' (that is, transferability) of experiences and policies from one country to another. Ryan (p.6) notes the point made by Richard Rose (of relevance here) of:

> *. . . the tendency of mainstream economic theory to assume fungibility, or the ready transfer of VET practices from one nation to another, in contrast to the assumption of blockage, or the impossibility of transfer, implicit in much policy discussion. However, as Rose locates VET towards the blockage end of the spectrum, in view of the importance of its social, economic and institutional contexts, he appears implicitly pessimistic about the scope for learning from abroad.*

If VET practices really are 'non-fungible', statistical analyses of international, cross-sectional data on VET (such as in Cullen's work discussed above, for example) are of questionable relevance and value. However, this view appears to be extreme among the research and policy fraternity in VET, although (in discussing Kevin McCormick's paper) Ryan (p.9) notes:

> *In seeking to match the training and motivational advantages of Japanese firms, inappropriate financial institutions and cultural differences make it impossible for Britain simply to import Japanese practices—which would in any case entail side effects which a liberal society might wish to avoid.*

If, as it seems likely, there are forces in every society that attempt to bring about consistency in various bits of its own *modus operandi*, it is not sensible to simply to *copy* a practice from another country. What is needed is to learn the lessons that can be drawn from that practice and to develop practices for one's own country that produce a similar effect.

An important paper in the volume (by Robert Lindley) illustrates an analogous danger for VET policy in uncritically accepting standard classifications of formal educational qualifications and nominal occupational titles. Again, Lindley's argument is that the focus should be on the real work skills required in the workplace, not on statistical surrogates for such skills.

Lindley argues that conventional economic analysis of industrial–occupational change ignores changes taking place in *job content within* occupations and in the *relationships between* occupations.

In order to examine changes in job content, Lindley makes three sets of distinctions between:

- function and occupation
- shifts in the way a function is organised which alter jobs sufficiently to be recorded as changes in the occupational data and those where much significant change in job content is not captured in such data
- skills actually employed, entry requirements for a job, and qualifications held by an individual doing a job

Lindley argues (pp.186-187) that the real focus should be on work skills.

> *The functions should then represent the underlying activities rather than the way in which they are carried out via occupations. The skills should represent the abilities and experience needed to do the jobs created in the occupational hierarchy rather than the formal educational qualifications or other vocational training conditions used as minimum entry requirements or held by the 'average' person in the occupation. The most readily obtained information at national level is, however, occupation by qualification and this blurs all three distinctions made above.*

Lindley adds (p.196):

> *Studies of skill shortages indicate that poor utilization of existing skills and provision for updating or extending them is of greater significance for the growth of those industries affected than is the inadequacy of initial training of young people either in terms of numbers being trained or the quality of their training.*
>
> *Research on the structure and behaviour of labour markets indicates that, whatever the inadequacies of the education system, the stance of employers on questions of recruitment, training, relative pay and other conditions of service can seriously undermine attempts by the education system to respond to the 'needs of industry'.*
>
> *. . . Disappointing economic performance may not itself be due to the existence of skill constraints but, should inadequacies in complementary areas of industrial development (marketing, product strategy, R&D, etc.) be tackled, this may land the economy with a major problem with the supply of skills. On this basis, economic regeneration must take place simultaneously over a broad front with progress in one area reinforcing that in other areas.*

Lindley emphasises that assessments of the adequacy of the stock of VET skills should be made only in the context of the interdependence of this stock with other economic and social factors, including labour market factors, as well as other factors affecting economic development and the demand for skills.

Four broad working scenarios for VET policy arise from the papers in the book:

1. *Over-qualification at the low skill end of the occupational spectrum . . . which co-exists with a more specific (and internationally variable) problem of under-qualification and skill shortages in certain intermediate occupations . . .*
2. *Successful economies will extend and intensify their intermediate skills base across a wide range of production and service industries.*
3. *Higher quality VET required to achieve the above will produce strains even in countries with a strong employer commitment to broadly based training.*
4. *In the case of the UK, there is likely to be increasing pressure to externalize more of the education and training function, despite the philosophy that 'the place for training is in industry.'*

These are the sorts of potential outcomes that a sensible comparisons approach is likely to open up for consideration by VET policy-makers. But offering this sort of prospective possibility is very different from attempting to lay down prescriptive benchmarks for countries to achieve.

Labour market analysis

The labour market analysis approach to assessing the adequacy of available skills employs models of markets for skilled labour to forecast future excess supplies and excess demands; and to formulate policies to ameliorate such imbalances, if such policies can be identified and implemented.

The classic work in the field of economic modelling of skilled labour markets for the purpose of educational planning is R B Freeman's 1976 study, *The overeducated American*. This work is an intellectual *tour de force*, but Freeman himself is the first to acknowledge that the skilled labour market forecasts stemming from the models face a high risk of being wrong.

The author begins by noting that a college education has traditionally been a major social and economic advantage for Americans. It has provided individuals with high earnings and occupational status. Viewed as an economic investment in skills, college training has also been profitable to American society.

A general consensus among policy-makers and analysts emerged in the 1960s, supported by available data, that college training was a fruitful economic investment for both the individual and the society, one leading to a vastly different type of workforce than that in traditional industrial society.

In the 1970s, however, a very different picture of the college worker in the labour market emerged. For the first time since the depression, graduates had difficulty in obtaining college level jobs.

Freeman developed a model of college labour markets that was capable of tracking both the 'boom' and the 'bust' episodes in those markets. His principal findings about the 'bust' times are (pp.184–188):

1. *The college job market underwent an unprecedented downturn at the outset of the 1970s, with young graduates just beginning their careers the most severely affected. Real and relative earnings of graduates dropped, employment prospects and occupational attainment deteriorated, and large numbers were forced into occupations normally viewed as being below the college level. For the first time in recent history, the economic value of an investment in college education fell, although with considerable variation among professions and groups.*
2. *In response to the depressed market, the proportion of young men enrolling in college dropped substantially, reversing the long-term upward trend in educational attainment . . .*
3. *Student career decisions were substantially altered by the changing economic fortunes of the various high-level occupations . . . Overall, the shift was from the academic and scientific to the traditional professional, and business-oriented specialties . . .*
4. *Four major factors determine the dynamic functioning of the college job market: the responsive supply behaviour of the young; the long working life of graduates, which makes total supply relatively fixed in the short run; the concentration of graduates in certain sectors of the economy and moderate substitutability between college-trained and other workers; and the cobweb feedback system, which leads to recurrent market oscillations, because high salaries and good job opportunities induce many students into certain fields of study, producing a flood of graduates 2 to 5 years later, and, all else the same, a relative surplus that in turn reduces salaries and employment opportunities, depressing enrolments, and so on.*

5. *The downturn of the 1970s was caused by slackened growth of demand, due to reduced expansion of industries which employ many college-trained workers, and continued increases in supply . . .*

6. *The decline in the college market was most severe in the teaching and research professions, and least in business-oriented specialties, reversing the pattern of the 1960s . . . Within the research and teaching areas, however, the market experiences of different professions varied greatly: the economic position of physicists plummeted, that of biologists did not . . .*

7. *By contrast, graduates with degrees in business specialties, including those in accounting and business administration, especially at the masters level, in medicine and in engineering fared reasonably well in the falling job market . . . Engineering . . . enjoyed a cobweb upsurge in the mid-1970s . . . Law . . . began a downswing in the mid-1970s . . .*

8. *Forecasts of the state of the college labor market using the recursive adjustment model indicate that the economic position of new bachelor's men is likely to remain depressed through the end of the 1970s, will improve moderately in the early 1980s and rapidly in the late 1980s, though not to the boom conditions of the 1960s. The major force improving the market will be a reduced supply of new baccalaureates . . .*

   Throughout the period . . . various professions and social groups are likely, as in the past, to fare very differently in the job market . . . In contrast to the past, higher education will be a 'marginal' investment, not a sure 'guarantee' to relatively high salaries and occupational standing . . .

Freeman notes (pp.6–7) that the most difficult problem faced by an analysis of such a situation is to predict how long the depressed market for college graduates is likely to continue. He is unsure of the likely period himself.

He argues that forecasting the future is a hazardous business in the social sciences. The model used as a basis for the forecasts may be faulty. A model that fits one period and seems valid may—because of omitted factors or changes in the social system—turn out to be inapplicable in another. Even with a correct model, forecasts can err because of changes in exogenous factors, falsifying otherwise correct inferences about the future.

One way to handle this problem is to make several forecasts, each dependent on 'reasonable' expectations of the future state of the world and then to evaluate the robustness of each forecast to changes in such future states.

Freeman argues, however, that even apparently robust forecasts in terms of such sensitivity analysis should be treated cautiously because social scientists do not have an enviable record of peering accurately into the future. At the end of World War II, most expected a return to the Great Depression; in the mid-1960s, few, if any, anticipated gains for black Americans; while *no* analyst predicted a collapse of the college labor market in the early 1970s.

Freeman concludes (p.199) that 'even for those elements of reality, for which [an economist's] training is suitable, the history of [economic] forecasts is replete with failure'. Thus, he says, his own discussion of the period of over-education in America, and its possible characteristics, must be viewed as 'speculative guesswork' that merely points the way for more detailed analysis.

Freeman's work demonstrates that even well-established generalisations about skilled labour markets may not properly describe some sub-markets which may behave in quite different ways. He also highlights the phenomenon of dynamic 'cobweb' adjustment of labour markets to imbalances of supply and demand. This pattern of adjustment may lead to unwittingly counterproductive responses by governments. A classic example of such a response (in a different industry) in Australia was the 'vine pull' program of the late 1980s when the Commonwealth Government financed the destruction of large quantities of allegedly surplus vines producing particular red wine grapes. In actual fact, instead of a surplus, substantial excess *demand* for such red wine grapes emerged, resulting in a very large increase in plantings.

A volume of important papers

A more recent endeavour to model skill markets is a collection of important papers put together by Hilary Metcalfe (ed. 1995). In introducing and summarising the papers in this volume, Metcalfe says (p.1):

> *An increasing body of evidence suggests investment in education and training is necessary for enhanced economic performance and that skill development is essential to economic advancement in the face of global competition . . . However, agreement on the importance of education and training neither tells us which skills are required nor the policies which will lead to their development.*
>
> *The shortages and gluts we have been experiencing give seemingly conflicting messages on the nature of the skills needed . . .*
>
> *The problem of skills development in the United Kingdom is commonly seen as one of supply: not enough people are produced with the necessary skills . . . However, the evidence in this volume seems to suggest another problem, that of lack of demand for skills in the economy and the fact that skills are not utilised in appropriate jobs . . .*

Further, in an important paper in the same volume, Peter Robinson (in Metcalf 1995) argues that the consensus that the failings of the education and training system are a major contributor to Britain's economic problems is wrong. In his judgement, Britain's skills base does not seem to be out of line with countries offering a similar standard of living. The 'skills revolution' that people were calling for in the 1980s has already occurred, Robinson argues. He concludes (p.108):

> *Given this, and given the uncertain nature of the evidence purporting to show a causal link between educational attainment and economic performance, the continued heavy focus on education and training as the number one priority for public policy in Britain looks more like a desire to avoid having to give full weight to other issues of importance to our economic performance, which may be more pressing, but which are also more complex and more controversial.*

In the final paper in the volume, Ewart Keep and Ken Mayhew (ibid.) also argue that the consensus view (that boosting the supply of education and training will produce positive economic and social results for individuals, employers and the economy as a whole) may be an inaccurate assessment. They argue (p.111):

> *. . . More and better VET is not an end in itself. It will only produce a worthwhile payback if the skills that are created are needed and can be utilised. Put simply, our argument is as well as possible problems with skill supply, Britain has traditionally experienced a simultaneous problem of weak demand for skill. This weak demand has, at least in part, been the cause of many of the difficulties with skill supply. Furthermore, the high skills vision may only apply to some sectors of the economy and some parts of the labour market. In others, at least in the short to medium term, different routes to competitive advantage are being and will be pursued.*

In short, Metcalfe's book underlines the complexity of achieving and maintaining competitive advantage, and of finding an appropriate and effective role for work skills in such a task. While economic modelling of labour markets can be instructive, it can also be deceptive and lead to wrong policy prescriptions. As Porter argues in *The competitive advantage of nations* (see the chapter on manpower requirements), the development of work skills should be treated as a consistent part of a broad process of economic evolution, not as a factor that can lead economic progress on a forced march.

Indicators

The indicators' approach looks at indicators of the present and likely future condition of particular skilled labour markets to form judgements as to the most appropriate courses of action to take to improve anticipated skilled labour market outcomes. This has been the most frequently used approach to assessing the adequacy of the stock of VET skills in Australia.

The classic report outlining such an approach is the report, *The supply and demand for skilled labour: A framework*, (1983) by the Department of Employment and Industrial Relations for the Department of Labour Advisory Committee (DOLAC).

The methodology in this report was designed to enable the provision of regular forecasts of future supply and demand for skilled labour at both State and national levels. The methodology was based on analysis of eight major trades, which accounted for nearly 70 per cent of all technical and further education (TAFE) enrolments at the time. The methodology identified key factors influencing supply and demand, described their effects on some specific trade occupations and discussed the issues of major importance in assessing overall supply and demand.

The authors argued that, if left alone, labour markets will adjust in the long run by changing relative wages and hours, by changing the qualifications needed for jobs, by job restructuring, and so on. However, in the short run, over- and under-supplies of skilled labour lead to costs for individuals and for the economy. Manpower forecasting and planning, if undertaken as proposed, could reduce these costs.

The analysis begins by describing each skilled labour market in terms of data relating to qualifications, historical trends in skills, the nature of employment in it, its demographic composition and spatial distribution, and its turnover characteristics. Factors influencing demand for the skill—employment trends, economic activity, structural and technological change, government policy, demographic change and net occupational separations (replacement demand)—and supply of the skill—enrolments in courses, skilled immigration, informal skill acquisition on the job, and unemployment—are subsequently examined.

This approach was adopted because the authors were aware of 'problems' associated with 'numerical modelling' of the labour market. They believed that an 'analytic' (qualitative) framework for assessing future supply and demand was preferable to a quantitative approach. This 'analytic' approach, they argued, should focus on 'underlying factors' influencing supply and demand, as a 'guide' to overcoming structural problems. The approach should aim to maximise the use of current and historical information relating to the operations of occupational labour markets. A further aim should be to systematically improve the relevant data and analytical bases over time.

An Australian application

Ultimately, however, notwithstanding the political desire at the time to use manpower planning to solve labour market problems, DOLAC, sensibly, reverted to examining a range of indicative data as a basis for coming to better informed decisions on what should be done in each circumstance.

An ongoing annual series of Commonwealth Government reports, starting with the 1987 report of the Department of Employment and Industrial Relations' Occupational Analysis Branch, *Occupational outlook—The supply and demand for skilled labour*, has exemplified the 'indicators' approach'.

The annual *Occupational outlook* contains an overview of economic and labour market developments focussing on:

- an analysis of sectoral growth in employment and the relationship between skilled labour markets and the economy
- an occupational summary providing an overview of education and training, and supply and demand issues in particular occupational labour markets
- detailed assessments of the supply and demand balance in each skilled occupation covered, together with overview articles for the major occupational groupings

A broad analysis of occupational developments within an industry framework, and an assessment of the likely future trends in activity levels for particular industries, is included.

The intended uses of the *Occupational outlook* are in:

- training policy to be adopted by the various State and federal agencies concerned with the development of skills
- immigration policy relating to programs focussing on the net flows of skills for particular occupations
- career planning, where industry outlook figures are provided to school and university advisers to be used as career advice and counselling purposes
- job placement information for government job agencies placing job seekers
- general information distributed to the public, government agencies, employers, educational institutions and media users

The *Occupational outlook* makes the point that skilled labour markets are subject to rapid change as a result of graduations from the education and training system, skilled persons re-entering the labour force, and the migration of skills. These three factors contribute to the dynamic nature of skilled labour markets and imply that guidance based on previous years' data is difficult and may be fraught with danger.

The report presents information for around 200–220 skilled occupations using the following format:

- occupation title
- employed labour force: numerical range
- training: locations and numbers
- recruitment: where persons are recruited
- description of nature of work
- supply of skills
- demand for skills
- summary outlook

Occupational outlook has been one of the more sensible and valuable aids to understanding skilled labour markets in Australia. It presents a relevant range of the available data clearly and succinctly, while remaining aware of the limitations of concluding too much. A weakness of the *Occupational outlook* is that, in hard copy form, it is not possible to deal effectively with local labour markets (State, city, town, rural, etc.). For the same reason, the range of relevant

indicators that can be presented is also very restricted. Both weaknesses could be overcome by moving the *Occupational outlook* to an electronic format.

The Australian National Training Authority (ANTA 1988) also use the 'indicators' approach' to assess the balance of skills in Australia in its 1997 annual report, *Vocational education and training performance, Annual national report 1997*, volume 3.

In its annual report, ANTA notes (pp.12–20):

> *The state of the economy and the labour market are critical influences on the vocational education and training sector as the demand for skills acquired through vocational education and training emanates from labour market requirements.*
>
> *. . . The impact of the economic outlook differs across industry sectors and consequently also across States, Territories and regions. Differences in growth rates across jurisdictions arise because of differences in the profile of industries within each jurisdiction . . . and because of differences in industry productivity growth, government economic policies, settlement-patterns of immigrants, and inter-jurisdictional migration . . . Notwithstanding the mobility of skills resulting from inter-jurisdictional migration, the differences in the economic profiles* [of] *States and Territories translates into differences in the nature of training needs across Australia. Such differences need to be considered when making an assessment of the relative demands for vocational education and training within each jurisdiction . . .*
>
> *Industries with high rates of output growth (where workforces are expanding or improving their productivity) are likely to have elevated levels of demand for skills acquired through vocational education and training. Moreover, industries with expanding workforces employ greater numbers of new entrants to their labour force with specific skill acquisition needs, while those industries seeking productivity improvements often include 'upskilling' of their existing workforce within their productivity improvement strategies.*
>
> *In addition, the demand for vocational education and training may also increase if more skilled people are required to operate modern equipment, if industries upgrade existing processes and/or products, or require an enhanced level of skills across their workforce generally.*

The ANTA annual report includes ABS data on employment growth and job vacancies by industry and occupation, as well as the Skilled Vacancy Index published by Department of Training and Youth Affairs (DETYA), providing a regular indication of likely occupational expansion or contraction. The report notes ABS data on the changing mix of full-time and part-time jobs and the ensuing complications for VET. Other aspects of the labour market as reported by ABS are also noted in the ANTA report. These are the size of the teenage labour market, the ageing of the labour force and the qualification profile of the Australian workforce. More than 30 per cent of the workforce now hold a VET qualification.

The report also uses OECD data to compare Australia's post-compulsory school qualifications profile with other OECD countries, arguing (pp.19–20):

> *It is generally recognised that improved rates of participation and attainment in vocational education and training, in keeping with our international competitors, can potentially contribute to increasing Australia's economic competitiveness.*
>
> *. . . Notwithstanding differences in data definitions and collection methods that make cross-country comparisons problematic, the data presented. . . suggests that there may be a gap between the current Australian skill base and the skill base of overseas countries.*
>
> *To address the question of what is the desired level of vocational education and training skills in Australia, a new key performance measure* [KPM] *has been agreed: KPM – Stocks of vocational education and training skills against desired levels. This key performance measure is designed to be an analytical and diagnostic tool. The KPM will help determine the extent to which the vocational education and training system is increasing Australia's skills pool in ways relevant to Australian industry and with respect to the development of the economy overall. Further work, in consultation with States/Territories, the Commonwealth and industry, is still required to develop the*

methodology for measuring and reporting against KPM 2. The analytic work is to focus on expressed Australian industry demand for VET skills as well as the imputed demand to achieve internationally competitive VET skills.

In short, ANTA also adopts an indicators-based assessment of VET performance. Notwithstanding the understandable desire for harder-edged tools to assess the adequacy of stocks of VET skills against desired levels (such as the proposed KPM 2), the indicators approach adopted by ANTA is both pragmatic and intelligent.

A way forward

In our view, a balanced reading of the research literature (presented above and in the appendix below) sits comfortably with the view stated earlier in this paper that, in the end, technocratic 'solutions' to meeting the skill needs of industry turn out to be ambiguous and illusory—which is why so many such schemes have failed. Reality points to the value of flexibility not only in the education and training system itself, but in the labour market as well, allowing adaptation and adjustment to occur to ameliorate the effects of the inevitable errors in investments in skills resulting from the incorrigibly-imperfect foresight of human beings.

There appears to be no substitute, in fact, for sensible people, at key decision-making points within a flexible labour market, making informed judgements based on an array of relevant and accurate indicators, faced by appropriate incentives, and bringing options for reform to the attention of people and institutions charged with considering such matters.

This perspective has informed the approach to assessing the adequacy of the stock of VET skills adopted in the present report. The approach derives inspiration from the research presented in Richard Blandy and Sue Richardson (eds), *How labour markets work: Case studies in adjustment*, 1982. This approach focusses on adjustment processes in labour markets for skills defined at a level of detail as close as possible to that sought by the enterprises with which various policy-makers deal. This detail, as well as the policy options open to different policy-makers, may vary. For example, the detail required and policy options available to ANTA in making its decisions are likely to be different from the detail required for, and options open to, the Smartville Institute of TAFE.

The approach focusses on establishing a large number and variety of indicators of imbalances in the demand and supply of skills defined as available for, and needed by, each target group of enterprises. These indicators include measures of labour market adjustment mechanisms like wage rates; unemployment rates; queues and vacancies; promotion rates; hiring, quit and retrenchment rates; qualification requirements; on-the-job training by enterprises; and movements of skilled people in and out of the labour market area. The indicators also include measures of impending shortage and oversupply like forecast increases of skilled employment in the labour market area; and forecast increases of graduations of skilled people in the labour market area.

Such indicators should be expected to be updated as new data come to hand from various sources so that a relevant picture of each labour market is available for decision-makers on each occasion that they wish to come to a view about the adequacy of particular stocks of VET skills.

The approach proposed here also considers a range of policy options to deal with potential problem issues raised by the views so formed. These options depend in part on the institutional framework surrounding each particular skill. For example, equilibrating wage movements may not be an option in some labour markets, while tenure may restrict the scope for retrenchment in others. A range of policy options is useful to consider because the most appropriate solution in many cases may not be to do something about education and training, but to take some other action.

What is needed in order to assess the adequacy of the stock of VET skills is something like an upgraded and highly detailed *Occupational outlook* (see chapter on indicators). However, provision of the desired indicators at the level of detail and coverage necessary, requires an electronic format. Hard copy publication would necessitate thousands of pages of indicators, most of which would be irrelevant to each individual decision-maker. The tailor-made indicators and other research tools required by decision-makers can only be generated, in a focussed and timely manner, from electronic links to a series of databases, which can be updated as new information comes to hand, without disturbing the framework within which the indicators are presented.

Two decisions need to be made:

- What should the framework be, including the range of indicators and any descriptive and reference material?
- How should the electronic links be formed that generate the indicators and descriptive material required by users of the material?

Framework for VET skills database

We propose that the basic framework for such a database should be the electronic equivalent of the research tools that a person researching the adequacy of the stock of VET skills in a specific industry (for an ITAB, say) might hope to assemble on their desk. This set of materials would be grouped around an 'occupational/industry spreadsheet'. The spreadsheet would contain data collection dates in the row headings, indicator labels in the column headings, data in the cells, commentary about the occupation, a list of related or previous studies, a list of relevant contacts (for example, ITABs, industry associations), etc.

The 'occupations' that could be generated include ASCO occupations at each level of disaggregation, cross-classified by ANZSIC industries at each level of disaggregation, cross-classified by location at each ABS level of disaggregation. A large quantity of data in such a huge matrix will not exist, of course. People seeking information on occupations for which there are essentially no data need to be directed (by an appropriate process) to the closest occupational category for which data exist.

Industry consultation is integral to this process. Industry would be expected to comment on the relevance of the indicators chosen and to provide company or industry association data to be used as an enhanced 'local' data series.

Examples of the 'occupational/industry' indicators that might be proposed, not all of which are relevant for every occupation, are:

- employment (full time/part time)
- forecast employment (full time/part time, Econtech/COPS)
- duration of attachment to firms in industry
- unemployment
- vacancies
- promotions
- recruitments
- quits
- retrenchments
- layoffs
- union members
- tenure (workers with continuing contracts)

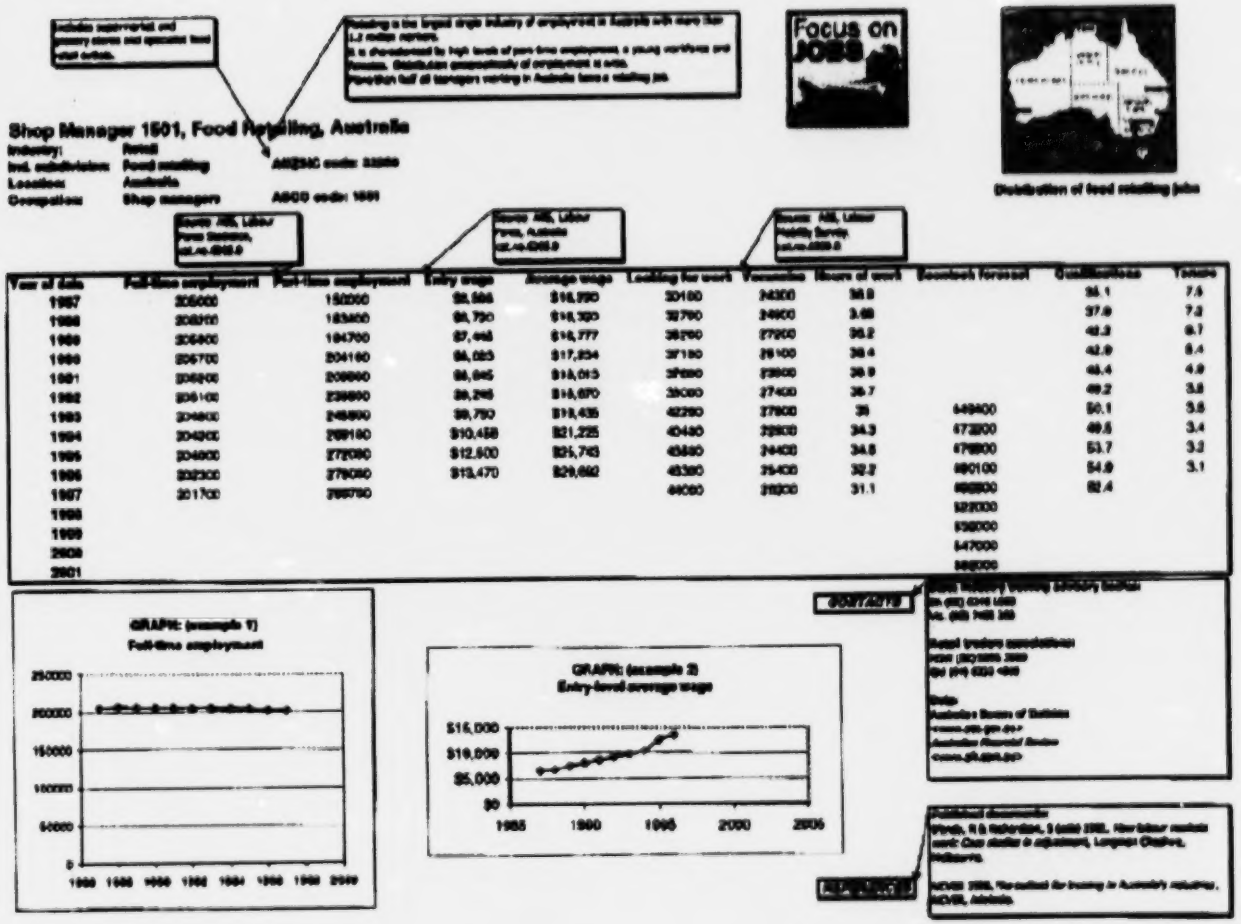
- queues (applications for jobs)
- wages (entry/average)
- qualifications profiles (workforce/recruits/retrenchments)
- hours of work
- moving to another occupation
- cobweb cycle (presence/length)
- training/learning cost per employee (company data)
- skilled-but-not-qualified employees (company data)
- skilled-and-qualified employees (company data)
- sources of skilled labour (internal/VET/immigration/poaching—company data)
- changes in work performed by employees (company data)
- rate of replacement of/modification of/investment in equipment (company data)
- rate of geographical/product market change (company data)

A sample spreadsheet presenting indicators relating to an 'industry/occupation' follows (see figure 5). The occupation is 'Shop manager 1501, food retailing, Australia'.

Electronic links

The spreadsheets proposed above could most efficiently be generated by links to databases containing data on each indicator. These could be provided by a central authority like ANTA or the National Centre for Vocational Education Research (NCVER) augmented by 'local' databases (ITABs, TAFE colleges, chambers of commerce and industry, companies, university surveys, etc.). These databases would contain not only numbers, but also commentaries, bibliographies, lists of contact persons, etc. The presentational possibilities of the spreadsheets would include graphical and computational options (maps, trends, rates of change, etc.).

The central databases and the computational and graphical 'front ends' to the spreadsheets, including their capacity to accept 'local' data, would need to be maintained and updated regularly by a central authority like ANTA or NCVER, on the one hand, and by the units of industry or local organisation like ITABs and TAFE colleges, on the other.



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An aggregate measure

The grass roots, decision-making *schema* outlined above, does not provide higher level VET decision-making bodies with the summary performance measures that they desire for effective policy setting. Here, we show how VET decisions taken in the way that we have recommended, at the grass roots, can be aggregated to give such summary measures. Such a measure could be used to assess the extent to which the stocks of VET skills in Australia meet desired levels—which has been proposed as a key performance measure by ANTA.

This key performance measure was intended to be an analytical and diagnostic tool. It was intended to help determine the extent to which the VET system is increasing Australia's skill pool in ways relevant to Australian industry and between the current skill base and the skill base of overseas countries.

Background—national accounts

Vocational education and training is an economic activity. VET uses up resources, costs money and provides incomes to people. Implicitly or explicitly, VET activities form part of a country's national accounts. National accounts have been produced in today's economically advanced countries for half a century. These accounts record, classify and aggregate each country's billions of economic transactions quarterly and annually. The goal of this exercise is to provide measures of:

- the structure of each economy
- the income created by each economy

The creation of income is fundamental to the economic welfare of each nation's citizens, providing employment and capital assets for the citizens, on the one hand, and spending power, on the other. The distribution of economic welfare among the citizens can also be explored using the national accounts.

National accounts can be used to examine the impacts of policy decisions made by governments on economic activity. The relationships between particular economic structures and the creation, growth and distribution of national income, jobs, poverty, and so on can also be examined. For example, by measuring the VET sector, the effects of government decisions on VET can be assessed and the impact of changes in VET can be traced through to changes in other sectors, changes in people's incomes, and so on.

Insofar as a number of countries develop such accounts using the same principles, assumptions and classification systems, comparisons can be made between the various countries' accounts which may permit further exploration of the impacts of government policies and of economic structures on economic performance. Hence, if a number of countries measure their VET sectors using the same national accounting methods, valid and consistent comparisons can be made between these measures.

Broadly speaking, the income produced in an economy is the income available to be spent on 'final' goods and services; that is, goods and services not used up in the production of further goods and services. The reason for this is that the value of 'intermediate' goods and services

will necessarily be included in the price or cost of the 'final' goods and services in the production of which they have been used.

The value of the final *stage* in the chain of production involved in producing a final good or service may only be a small fraction of the total value of that final good or service. This fraction of the total value of the final good or service is the *value added* by the final stage. It can be seen that the total value of each final good or service can be derived by summing all the *values added* at each stage of the production process.

Hence, the annual national income of a country must be equal to the *sum of values added* by the billions of productive activities going on in that country annually, including values added in government economic activities and economic activities undertaken by non-profit organisations. National income necessarily includes value added in the VET sector.

The value added by each productive activity is also the income available to be distributed to the employees and owners of capital used in producing the goods and services that the activity produces. Hence, value added in the VET sector is equal to the sum of the incomes received by people employing others, or being employed, in VET activities.

The VET sector can, therefore, be measured in either one of two ways, each of which is consistent with national accounting principles:

- by adding up the values added by VET
- by adding up the incomes received by employees and owners of capital involved in VET

Classifying activities in the national accounts

In order to make some sense of the myriad of activities undertaken in a modern economy, it is necessary to classify activities into a few simple categories. How should economic activities be classified?

The answer depends on the role that each activity plays in the overall economy. Identifying which roles are important depends on how people believe the economy works. How VET skill formation should be classified depends on what role VET is seen to play in the economy.

For some purposes, it is valuable to know what is happening to the industrial structure of the economy. Is the manufacturing sector expanding or shrinking? What is the state of the agricultural sector? The mining sector? Retailing? Community services? And so on. Since the goods and services produced by each of these sectors are significantly different from the goods and services produced by the others, the industrial structure of the economy, and changes to it, particularly by comparison with other economies, can tell us a good deal about an economy's evolutionary track.

By identifying the VET sector separately in a number of countries, by observing what happens to it in relation to the rest of the economy, and by examining various economic outcomes, a better understanding of the nature of interactions between VET and the economy as a whole can be determined. It is possible to describe more adequately and accurately how VET activities may affect an economy's evolutionary track.

Each economy's evolutionary track has implications for different groups of people within the country, because people's social and economic fortunes are generally related to the performance of particular industries. Investment decisions, including career decisions by people about the sorts of education and training that they should undertake, can be better informed. Governments can make better-informed decisions when attempting to shape the economy's evolution in ways they judge to be more effective and preferable.

For other purposes, it is valuable to know what is happening to the functional structure of the economy. How much of the economy is being devoted to meeting the consumption demands of households? How much to meeting the investment demands of business? How much to

meeting the consumption and investment demands of governments? How much to meeting the demands of foreign buyers?

The reason for interest in these dimensions of the economy is that each dimension serves a different purpose. *Consumption* goods and services are totally used up in meeting immediate wants. *Current* living standards necessarily depend on the extent of household and government *consumption* in the overall economy. Because skills are durable and a fundamental source of productive capacity, VET skill formation is not well classified as consumption. It would be better classified as *investment* (see below). Notwithstanding this point, VET skill formation, along with other educational activities *is* classified as consumption in the national accounts.

Investment goods and services are not totally used up in meeting immediate wants, but provide the capacity to meet future wants by expanding the basis for producing consumption goods in the future. Investments provide a stream of future returns (future consumption gains) whose present value exceeds the cost of making the investment (the present consumption foregone). *Growth* in living standards, therefore, depends on the extent of business and government *investment* in the overall economy. VET skill formation exhibits similar characteristics, and should be seen in large part as an investment activity.

The share of exports in the overall economy captures the extent of the economy's integration with and dependence on the rest of the world's economies (where a bigger share means a better economic structure from many points of view). The difference between exports and imports represents borrowing from or lending to the rest of the world, depending, respectively, on whether imports exceed exports, or exports exceed imports. VET's contribution to this balance may provide valuable information as to how sustainable our economy is in an internationally competitive sense. Is our VET sector so internationally competitive that many people from overseas want to gain skills from it?

Armed with information about the functional structure of the economy, particularly when viewed in comparison with other economies or with the economy's own past, citizens, businesses and governments are in a better position to make judgements about whether living standards are likely to grow, whether the present level of economic activity is sustainable, and so on, and to take better-informed decisions as a result.

Tests of economic value

How can we know that the economic output measured by the national accounts is of *real* value to the people of a country? How can we know that the VET sector, for example, is producing skills that are genuinely wanted and not just skills that are expensive, but useless? The national accounts cannot distinguish between these two possibilities, because they simply record the spending of money.

There are two ways of assuring ourselves that an economy's production (including the production of VET skills) is of genuine value:

- The product or service has been sold to a willing buyer, implying that the buyer regarded the product or service as embodying at least the value measured by the money spent on it.
- The product or service has been provided to the community by governments, whose performances in providing value for money can be subjected to open scrutiny and free debate in parliament and the media, and at periodic free elections.

The first of these tests is a market test of value; the second of the tests is a political test of value. Both tests are imperfect, but it is clear that the underlying principle is that the users or consumers of each good or service should be the final arbiters of its value—not the producers or providers of it. There should be clear mechanisms for inducing producers, whether private or government, to produce what users want. Hence, VET activities need to be assessed according to whether the skills produced are used or not, whether employers would like to

employ more or fewer people with the various skills produced by the VET system, and whether the citizens are happy with what governments are doing about VET.

Production (including the production of VET skills) that satisfies neither of these tests may carry no value for consumers and users and should not be included as part of the nation's production (or national income). Thus, while the Soviet Union in the past produced a great deal of output, the real value of its economic activity (its national income) was far smaller, because a great deal of its output had no value to users or consumers. Much of the Soviet Union's production was of intermediate goods that were never finished, or were final goods which had no willing buyers and that eventually had to be either dumped or scrapped. Many goods and services that did have value for consumers (housing, cars, consumer durables, food, vacations, and so on) were formally rationed by government or informally rationed by queues.

The solution to the problem of deciding whether particular kinds of government production (including government production of VET skills by TAFE or by private bodies funded by government subsidies and grants) have genuine value for the citizens of a country is to devise methods by which the interests of users and consumers can be signalled effectively to government producers. The system of government in the Soviet Union failed to solve this problem. A valid concern about the VET system in Australia is whether the decision-making structures relating to VET are sufficiently responsive to what Australia's businesses and citizens (consumers) really want. It is to address this concern that we have given so much weight, earlier in the report, to devising a process of effective grass roots decision-making for the VET system in Australia.

A summary measure for assessing the adequacy of VET skills

The purpose of the proceeding foray into national accounting has been to describe principles consistent with the framework of national accounts that can be used to assess the extent to which the stock of VET skills can be regarded as adequate.

First, all the activities forming part of the national economy that contribute to the formation of VET skills must be identified. As proposed in an earlier chapter, these skill-formation processes should be set in a framework, which as closely as possible emulates a grass roots, value-guaranteeing, market process. The process must set skills targets and performance measures based on the genuine demands of enterprises and workplaces. For consistency with the national accounts, activities that are not measured in money terms should be excluded. Both formal training and informal learning activities should be included.

Second, the identified skill formation activities should be valued by their values added; that is, the revenues (including subsidies) they receive *less* the cost of intermediate goods and services used in skill formation bought from other activities or sectors (for example, computers, software and services supplied by computer maintenance firms). Alternatively, an equivalent measure of value added can be employed, namely the sum of wages, salaries and profits (that is, incomes) that are earned from skill-formation activities. This clearly includes the wages and salaries of trainees (as well as trainers) attributable to their engagement in skill formation, rather than other activities.

Third, these values added (or incomes) should be summed to provide a measure of total value added for the VET sector as a whole; that is, annual additions to the stock of VET skills. This measure of additions to the stock of VET skills is consistent with measures of value added by other activities included in gross domestic product (GDP) and can, therefore, be compared with them, as well as being compared with similar measures in other countries, and with past measures of itself. These comparisons of consistently measured VET activity form the basis of creating a summary measure for assessing the adequacy of VET skills.

Fourth, if desired, the annual additions to the stock of VET skills could be aggregated (after appropriate depreciation of the economic value of earlier years' outputs of skills to allow for

their obsolescence) to provide a measure of the value of the *stock* of VET skills each year. It is not clear, however, whether computing this stock (and comparing it with similar measures in other countries, and with past measures of itself) would give further insight into the adequacy of VET skills in Australia compared with simply looking at the *annual additions* to the stock. One reason for this is that it is unclear at what rate to depreciate the value of earlier-learned skills, in part because many earlier-learned skills are likely to be continuously upgraded by use on-the-job in a relatively inexpensive manner. Another reason is that shortages of wanted skills due to the obsolescence of earlier-learned skills are likely to be reflected in current market pressure for greater training activity in the relevant fields. However, there may well be circumstances where such a stock measure could offer advantages, for example in determining immigration policy relating to skilled workers.

Implicitly, the ABS already undertakes the computations necessary to measure additions to the stock of VET skills in its current preparation of the national accounts. At present, however, it does not comprehensively identify VET skill formation as an economic activity in the national accounts. All that the national accounts identify is public and private final consumption and fixed capital expenditure associated with TAFE colleges. However, through several of its surveys (for example, employer training expenditure [ABS 1997b], employer training practices [ABS 1998a], and the most recent wave of the business longitudinal survey [ABS 1998c), the ABS already collects a wealth of information on enterprise training activities, including what the ABS terms 'unstructured' training within workplaces. These surveys, modified somewhat, would provide a ready basis for the identification and measurement of the full range of VET skill formation activities consistent with the national accounts as proposed here; that is, additions to the stock of VET skills. Suggested modifications are outlined below.

Value added by the formal ('structured') training component of VET is relatively straightforward to measure, because this training is provided by specialised training entities like TAFE colleges and private training providers. Value added by such entities is presently identified in the national accounts.

However, value added by formal and informal ('structured' and 'unstructured') training and learning activities provided on the job or in the workplace are not presently explicitly identified in the national accounts. In particular, payments of wages to employees for periods off work for training or for learning purposes whether off or on-the-job are not identified as training expenditures, but as production expenditures. These wage payments should be identified and allocated to the firm's training account rather than to its production account.

At present, training-related wage payments are attributed to the main production activity to which the enterprise has been classified by the ABS. In reality, however, enterprises that provide training should be regarded as having two activities—a production activity and a training (investment) activity. The resources devoted by an enterprise to investments in training and learning, including the wages paid to trainees while training or learning rather than working, should be counted as value added in investments in training, not as value added in the firm's main production activity.

When training or learning is a distinct activity separate from production, the identification of the costs of training or learning is relatively straightforward. For example, the time that people spend in such distinct activities can be valued at their wage rates. However, many (perhaps most) training and learning activities provided by firms are taught or learned in the workplace in the course of each firm's normal production activities. There is no distinct separation between production and training or learning. However, while training or learning is going on, it is reasonable to suppose that production will be less than when training or learning is not going on. Indeed, if this were not the case, the investment being made by the enterprise in the skill formation of its employees would be costless in economic terms and would not count as value added as far as national accounting principles are concerned.

Hence, an appropriate basis for estimating the cost of the investment made by a firm in the training/learning of its employees on the job would be as follows:

1. Estimate the loss of production resulting from the training or learning activity.

2. Apportion the wages of the people involved between training/learning, on the one hand, and production, on the other, on the basis of the ratio of the estimated loss of production to the estimated potential production if there had been no training/learning.

The loss of production involved should include the loss of fellow workers' production while they show or tell trainees/learners what to do. The wages of these informal 'trainers' should be apportioned between production and investment in training in the same manner as the wages of the trainees/learners.

Proceeding in this way addresses one of the strongest criticisms of present measures of investment in training—the narrow emphasis given to measures of *formal* training activity (especially off the job by specialised entities like TAFE colleges), and, even more narrowly, to the acquisition of formal *credentials*. These measures fail to capture the major investment in skills made by enterprises through the wages they pay to their employees while they are training, even in formal training. More significantly, current measures ignore the substantial investment made by enterprises in the skills of their employees through informal, 'unstructured' training/learning in the course of normal production.

Proceeding in the manner proposed provides a comprehensive measure of investment in VET skill formation by firms. The measure not only captures the reality of the training/learning process but is also consistent with the value added principles of national accounting. This measure can be added to the existing national accounts estimates of value added in education and training to provide an accurate measure of annual additions to the stock of VET skills. The only departure needed in the present framework of the national accounts is to recognise the dual nature of enterprises' activity in relation to their use of their employees' time, and to set up a 'skill formation investment account' for each firm alongside a normal production account. One consequence of doing so will clearly be to *reduce* the value of *production* recorded in the national accounts and to *increase* the value of *training* recorded in them by the same amount. This is appropriate and more accurate: at present the value of production is being overstated and the value of training understated.

The surveys of enterprises' training activities presently undertaken by the ABS (see above and below) already provide a solid framework for collecting such information. Additional questions need to be asked about employers' quantitative estimates of production foregone as a result of informal training/learning activities in order to be able to apportion wages between training/learning and production activities (as proposed above). The number of additional questions asked depends on the degree of detail wanted about the skills being learned. For example, if only an overall measure of informal learning is needed, only one question would need to be asked about production foregone as a result of the employers' informal training/learning activities as a whole. In addition, questions would need to be asked about employers' estimates of non-wage costs associated with informal training/learning, such as the cost of equipment, materials, travel, accommodation, and so on. The conceptual and definitional issues involved in identifying informal training/learning have already been well addressed in the ABS's existing surveys. Therefore, the marginal cost of gathering the required additional information would appear to be low.

An irregular/infrequent publication schedule of these data is not really a problem, as they are only needed to benchmark training effort occasionally. *Employer training expenditure, Australia* (ABS 1997b) and *Employer training practices, Australia* (ABS 1998a) are published frequently enough for this purpose. Dramatic changes in employers' training effort on a national basis are unlikely to happen rapidly. Biennial or even triennial data should suffice to pick up important trends.

The ABS quite often ceases collection and publication of a data series. For example, if the ABS were to cease collection and publication of *Employer training expenditure, Australia* and/or *Employer training practice, Australia* then a selection of the questions asked in these surveys,

sufficient to compute employers' expenditure on formal and informal training, would need to be attached to another survey, possibly the business longitudinal survey.

When added to the existing estimates of VET skill formation in TAFE colleges and the like, a comprehensive estimate of additions to the national stock of VET skills is created.

Employers' returns on investments in formal and informal training of their employees may be very high if employees already possess some basic skills, because the costs of building on those skills may be very low. Once a skill is learned, updating of that skill may involve very little reduction in output, because the initial training has greatly increased the employee's ability to learn skills similar to the type already mastered. This may be why employers prefer to hire 'experienced' workers, even if the precise skills needed are somewhat different from the skills held by 'experienced' workers. This is possibly the most significant externality associated with learning in the workplace. Those skills developed in initial learning efforts will often result in more efficient and effective (and, therefore, less costly) subsequent learning processes.

As noted earlier, the measure being sought to assess the adequacy of VET skills is intended to be an analytical and diagnostic tool designed to help determine the extent to which the vocational education and training system is increasing Australia's skill pool in ways relevant to Australian industry and between the current Australian skill base and the skill base of overseas countries.

What is the relationship between an improved aggregate measure of the value of additions to the stock of VET skills (as proposed here) and assessing the adequacy of VET skills?

As far as enterprises are concerned, the extent to which VET skills are adequate is best addressed by the degree of responsiveness of Australia's processes of VET skill formation to enterprise needs. Hence, as we argued previously, assessing the adequacy of VET skills from the perspective of enterprises is best addressed as an organisational framework issue rather than as a measurement issue. Provided the processes of VET skill formation yield skills that enterprises desire, then the stock of VET skills will be appropriate to industry's needs in a *qualitative* sense. Further, provided the processes of VET skill formation are responsive to firms' needs, then quantitative shortages or oversupplies are unlikely to persist for any length of time in the skills market any more than shortages or oversupplies in any other market. Hence, provided the processes of VET skill formation are responsive to enterprises' needs, the stocks of VET skills will always tend to be appropriate to industry's needs in a *quantitative* sense.

Clearly, the significance placed in this paper on including informal, 'unstructured', on-the-job training and learning to create an aggregate measure of the formation of VET skills is consistent with emphasising responsiveness to enterprise needs as the touchstone of meeting the skill-adequacy targets implicit in a measure of the adequacy of VET skills, such as KPM 2.

But any assessment of the adequacy of VET skills (such as KPM 2) has an important role to play apart from ensuring an appropriate qualitative and quantitative stock against levels desired by enterprises. That role is to inform national training policy from a government or community perspective. Here the focus is not so much on maintaining balance between supplies and demands in the skills markets, but on whether a different set of balances should be constructed by government policy. The focus is on the *government's* desires—not industry's. Is Australia lagging behind in skill formation compared with other countries, or in particular industries that the government wishes to promote because of those industries' perceived future strategic role?

The national accounts measure of additions to the stock of VET skills proposed in this paper is an appropriate basis for assessing the adequacy of VET skills for this purpose.

One basis for assessing the adequacy of VET skills would then be to make comparisons between the value of the current Australian training effort and the equivalent effort of overseas countries (measured the same way).

By accumulating annual additions to the stock of VET skills (in ways outlined earlier in this paper) to create a measure of the stock of VET skills in Australia (and in overseas countries), national accounts-consistent comparisons could be made between the value of the current Australian skills base and the skills bases of overseas countries.

Another basis for assessing the adequacy of VET skills would be a comparison of the rate of growth of the value of VET skill formation with the growth rate of other forms of economic investment. Is VET growing as fast as investment in plant and equipment? Is it growing as fast as expenditure on research and development? Is VET's growth rate decreasing or accelerating?

All these measures could, of course, be disaggregated by industry or by type of skill, for more detailed, but still consistent, policy comparisons.

How big is the VET sector?

How much bigger is the VET sector likely to be if measured more appropriately as proposed here? An estimate can be made as follows. *Employer training expenditure, Australia* shows that employers provided 4.9 hours of formal (structured) training per employee, on average, in the September quarter in 1996. Multiplying this figure by four gives an annual estimate of about 20 hours of *formal* training a year per employee.

Employer training practices, Australia, February (ABS 1998a), shows that 53 per cent of employers provided informal (unstructured) training. Half of these employers *only* provided informal training ('showing or explaining on the job', 'reading manuals and journals', 'group discussions', etc.), while half also provided formal training. It is probably conservative to assume that the production cost of such training amounts to the equivalent of a further 20 hours of paid *informal* training/learning a year per employee. This cost can be estimated directly (as proposed above p.44), by including additional questions in either the ABS employer training expenditure or employer training practices surveys of employers' quantitative estimates of employees' time and other resources spent in informal training/learning activities.

Adding these estimates of employee hours of formal and informal training gives a total of 40 paid worker hours per year per employee devoted to training and learning; that is, approximately one week, or about two per cent of wages and salaries. This is divided as one per cent of wages and salaries on formal training and one per cent of wages and salaries on informal training/learning.

Employer training expenditure, Australia (ABS 1997b) also shows that *total* expenditure by employers on formal training was *double* the cost of the *wages* paid to *trainees*. The other expenditure included wages and salaries paid to *trainers*, as well as the cost of equipment, materials, travel, accommodation, and so on. This means that *total* expenditure by employers on formal training amounts to two per cent of wages and salaries.

If we assume that the other costs of *informal* training (production lost by co-workers 'showing and explaining', etc., and equipment and materials used) added 50 per cent to the cost of *informal* training, then total expenditure by employers on *informal* training/learning would be approximately 1.5 per cent of wages and salaries.

Hence, a reasonable estimate of total expenditure by employers on both formal and informal training is approximately 3.5 per cent (two per cent plus 1.5 percent) of their wages and salaries bill.

The national wages and salaries bill accounts for slightly more than 50 per cent of GDP. In 1995/96 wages, salaries and supplements contributed $240 162 million (56%), at factor cost, to gross domestic product (ABS, 1997a). Hence, provided the assumptions underlying these estimates are approximately correct, total expenditure by employers on formal and informal education and training is roughly 1.75 per cent (derived as: 3.5 percent/2) of GDP.

Box 3: Total cost of training—Australia

Formal training

Hours of formal training p.a. per employee	= 20
Total cost is double cost of wages paid trainees	
Cost of formal training p.a.	= 20 hours pay x 2
	= 40 hours pay equivalent
	= 2% of wages and salaries bill
	= 1% of GDP

Informal training

Hours of informal training p.a. per employee (assumed)	= 20
Total cost is assumed to be 1.5 times the cost of wages paid trainees	
Cost of informal training p.a.	= 20 hours pay x 1.5
	= 30 hours pay equivalent
	= 1.5% of wages and salaries bill
	= 0.75% of GDP

Total cost of formal and informal training

	= 3.5% of wages and salaries bill
	= 1.75% of GDP

According to the ABS (1998b), *Expenditure on education, Australia* 1996-97, government spending on VET is about 0.6 per cent of GDP. If the estimate (above) of employer spending is correct, employers spend about three times this amount on training their employees, formally and informally. The total size of the VET sector in Australia is about 2.35 per cent of Australia's GDP (derived as: 1.75 per cent employers + 0.6 per cent government), making the VET sector as a whole about double the size of the university sector.

Conclusion

In this report, following a review of methodologies addressing the question 'Is the stock of VET skills adequate?', we propose that a methodology should be adopted that maximises the likelihood that the VET skills being created have real value to Australian enterprises. This methodology builds on and incorporates much previous work into a framework that is flexible and that permits people that need to make grass roots training decisions greater scope for doing so in an informed and rigorous manner. What this methodology attempts to do is to emulate a grass roots, value-guaranteeing market process, the results of which can subsequently be aggregated with some confidence into a summary measure of the value of the stock of VET skills. Not to start from such a basis offers the risk of engaging in 'Soviet accounting'—associating value with whatever skills the VET system might produce, rather than only with those actually wanted by enterprises.

The report proposes that skills targets and performance measures be set in the first instance by ITABs, and/or other grass roots training authorities, in a detailed way close to the real action on work skills—which is in the workplaces. This approach, over time, and with appropriate interaction among the various parties involved in VET, should lead to as strong a grip on relevantly assessing the adequacy of VET skills as it is possible to get, using all available qualitative as well as quantitative data, interpreted by knowledgeable and informed people.

What we are proposing is a flexible aid to better, more value-creating, VET decision-making and assessment, that recognises the futility (and even danger) in attempting to 'straightjacket' such assessments into a simplistic, centralised planning framework.

In addition, we have proposed a method for measuring and aggregating VET activities to yield a summary measure of VET performance that is consistent with national accounting principles and that can be used to provide comprehensive and consistent comparisons of Australia's performance with the performance of other countries, and of Australia's performance in VET compared with other forms of investment.

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Appendix

Other research examined

In order to be sure that the methodology recommended for assessing the adequacy of the stock of skills is based on a fuller range of methodological options, we examined a further 11 pieces of research (ranging from papers to books) which resulted from a library and internet literature search of the topic. Needless to say, these documents represented a small proportion of the relevant literature. The 11 annotated items of research literature have been arranged under four headings:

- manpower requirements
- economic and labour market analysis
- indicators
- other

Manpower requirements

Australian Education Council Review Committee 1991, *Young people's participation in post-compulsory education*

The review committee believes that there is a need for a more comprehensive debate to inform decisions about the balance that should be established between the education and training sectors. This balance should have regard to:

- student demand
- the overall composition of skills and qualifications existing in the society
- the capacity of the labour market to utilise those skills effectively

The proportion of people with higher levels of education and training has increased rapidly in recent years and will continue to do so as a result of the significant increases in education participation that have occurred.

In relation to the capacity of the labour market to use these increased skill levels effectively, the review committee believes that countries are reliant on forecasts and judgements which are, at best, broadly indicative. The committee does not believe that the provision of education and training should be determined solely by forecasts, as this would ignore the intrinsic values of higher education to society and to the individual. Relying solely on this type of forecast would also give them a degree of authority not justified given the rapidity and unpredictability of technological and societal change.

The review committee believes that there is no straightforward way of answering the question of how much this growth in qualifications will result in increased productivity and how much will result in credentialism. No analysis can provide insight into how changes in technology and the organisation of workplaces may hasten (or curtail) the demand for a more qualified workforce.

Jobs or occupations are not unchanging sets of tasks performed at constant levels of efficiency. The people performing them affect their jobs, and the nature of jobs may change with changing numbers of qualified persons. Training and education contribute also to economic growth through the increased productivity and flexibility of persons within each occupation.

Curtain, R 1989, *Addressing skill shortages: The limitations of macro-level labour market forecasting and an alternative approach*

Curtain discusses two limitations of labour market forecasting. Methodological bias, over-emphasising government's role in meeting industry needs, is the first limitation. The public's inability to recognise changes in the types and mix of skills required by occupations is the second. The report argues that through detailed collection of information on skills, technology and work at an industry level, forecasting of skill and training requirements can be made.

According to Curtain, traditional forecasting models are limited in that they are biased towards considering government funding and training activity, focussing on resource allocations within government-funded education institutions rather than the broader skill-creation system. Another limitation faced by traditional models is their inability to incorporate changes in the rate and direction of technological innovation, matters that obviously cannot be extrapolated from past trends.

The approach taken to forecasting by Curtain involves identifying broad industry skills and developing a 'comprehensive' industry training strategy based on a 'co-ordinated approach' to meeting skill needs.

Curtain argues that a major investigation of skill needs in each industry is required in order to ensure that a comprehensive assessment is made.

In addition, the influence of factors such as market conditions, production processes, batch size and company-level industrial relations as well as to the availability of labour in the local market has to be kept in mind.

Curtain concludes that the complexity of factors involved in shaping each industry's skill requirements also suggests that a more flexible 'intermediate' response is called for, rather than the 'marginally successful centralised macro approach'.

Curtain does not give much indication of the content of the 'major investigation of skill needs' he proposes, nor what his 'comprehensive assessment' might consist of which would make it more valuable than other calls for precisely the same thing which have failed to yield lasting value. Indeed, given the detailed company-level factors he believes are relevant, it is not at all clear how a study such as he envisages could be accomplished under any foreseeable budget and time constraints.

More appropriate is Curtain's other conclusion that the complexities suggest that a more flexible response to the problem is called for.

Siddiqui, A M A H 1992a, *Vocational training and the labour market: South Asia*

This paper considers strategies for reform of training systems, paying particular attention to a demand-driven approach. The author argues that there is a gap between the actual and expected results of vocational training. Unemployment among trainees, high dropout rates, and underutilisation of facilities and skills, are indicative of the crisis being faced.

The paper identifies four major targets for reform:

- improving market orientation in planning
- improving institutional responsiveness to market forces

- using training resources efficiently
- building capacity for policy implementation

The author argues that the old manpower projections' approach with which training planners used to work has largely been abandoned. Regrettably, there now seems to be a shortage of techniques and instruments which training policy-makers can employ with reasonable confidence.

In this respect, the report itself lacks suggestions for suitable indicators for the planning of skills development.

Siddiqui, A M A H 1992b, *Vocational training and the labour market: South Pacific*

The author argues that from having used elaborate mathematical forecasting models in the past, manpower planning today is more concerned with establishing continuous monitoring instruments, such as:

- tracer studies to assess the extent to which trainees find employment
- labour force surveys to regularly monitor open and disguised unemployment, as well as underemployment, by occupation and industry
- establishment surveys, through which employers are requested to forecast their needs of manpower for the next six months
- representative committees from the public and private sectors to help formulate training policies and to provide information on training needs, training curricula, and quality of training

The main reason for relying less on sophisticated long-term forecasts is that future manpower demand has proved very difficult to project on a general scale, as technological and labour-saving innovations are extremely difficult to foresee. On the other hand, greater reliance on labour-market signalling systems in their place requires greater flexibility and adaptive ability in the school and training systems.

Stromback, C T & P J Moy 1988, *Skill shortages and recruitment difficulties in occupational labour markets*

The authors argue that there is a widespread and persistent belief that Australia experiences recurrent shortages of skills. This is notwithstanding the evidence of flexibility in both supply and demand, which means that even large variations in demand for skill can be accommodated without significant shortages occurring. Changes in labour demand are accommodated through wage movements, quality changes, changes in participation rates, classification changes and changing hours of work.

However, the alleged co-existence of skill shortages and high unemployment suggests that fundamental structural problems exist. These problems have led to an interest in manpower planning and reform of the education and training system. Unfortunately, according to the authors, the record of occupational forecasting is not good. Poor methodology, data problems and failure to take account of the flexibility of skilled trades labour markets are the principal reasons for this poor performance.

Factors other than excess aggregate occupational demand (or expected excess demand) play a role in shaping perceptions of skill shortages.

There are two broad groups of influences:

- institutional factors (barriers to entry, wage fixing mechanisms etc.)
- firm-specific factors (management experience, firm size etc.)

The lack of multi-skilling and the existence of unwarranted barriers to occupational entry exacerbate skill shortages.

The authors discuss three different forecasting techniques:

- forecasts of occupational employment based on fixed coefficient production functions
- simulations of occupational employment patterns generated by major projects over a finite period
- employer surveys about expected changes in occupational employment

Because of employers' continuous sampling of the occupational labour markets, a high degree of recruitment difficulty may be a good predictor of an impending skill shortage.

However, skill imbalances are complex phenomena and while there ought to be some correspondence between recruitment difficulty and supply/demand imbalance, there are reasons for analysing recruitment difficulty more closely. This is because some firms tend to experience a consistent level of recruitment difficulty across all occupations. Perceptions of skill shortages may prevail in such firms under all market conditions because of their indifferent recruitment practices and poor personnel policies, resulting in high labour turnover.

Economic and labour market analysis

Booth, A L & D J Snower (eds) 1996, *Acquiring skills: Market failures their symptoms and policy responses*

The authors note that the acquisition of human capital is now recognised as central to countries' economic growth performance. 'New growth theory' is based on the idea of people making themselves more adaptable, as well as more productive, through the acquisition of skills.

Adaptability is crucial for keeping capital as well as labour employed effectively. People who acquire skills make capital more efficient too. Without a workforce continuously acquiring new skills it would be difficult to reap the benefits from technological progress.

Policy-makers disagree as to the ability of the market to produce enough skills to match the demands of the labour market. The supply of skills does not seem to have responded fully to changing patterns of demand, leaving some firms experiencing skill shortages and some workers experiencing underemployment of their skills. It is not clear exactly what should be done about this phenomenon.

The authors argue that possibly an important cause of inadequate stocks of skills may be a circular interaction between incentives to train and incentives to create skilled jobs. For example, economies may produce goods of low quality because there are few trained workers, but workers may have little incentive to acquire training because there are few employment opportunities to produce high-quality goods.

The second section of the book looks at public provision and policy. Policy prescription should be based not only on the possibility of market failure but also on the possibility of 'government failure'. Only if the cost of potential market failure outweighs the cost of potential government failure can a strong case be made for the public provision or regulation of training.

Inter-country comparisons should be made with caution. Countries differ in their allocation of activities between private and government sectors, as well as in their rules governing competition. What is market failure in one country may not be in another. Hence, it is not sensible to lay down hard and fast allocations of activities to one sector or the other.

Decker, P T & Rollefson, M R 1997, *Education and the economy: An indicators report*

According to the authors, education and skills are important because they expand a worker's capacity to perform tasks or use productive technology. In addition, better-educated workers can adapt more easily to new tasks or to changes in old tasks.

However, variation in the quality and quantity of education across countries is only one factor contributing to differences in worker productivity. Capital investment, technical innovation, foreign trade and government regulation can also affect productivity.

Training participation has increased in recent years, and is most prevalent among the more highly educated workers in highly skilled occupations, including management, technical and professional workers. Training is positively associated with education. Employment-related training in the United States tends to contribute to the earnings advantage already enjoyed by highly educated, highly skilled workers.

The authors note that not all researchers are convinced that producers will encounter an insufficient supply of professional, technical and managerial workers and an over-supply of less skilled workers in the future. Sceptics argue that upskilling within occupations due to technological innovation does not appear to be widespread. However, the average worker is likely to continue to need higher skills and more education in order to increase his/her productivity to compete for desirable jobs, and expand their earnings potential.

The authors point out that the occupations which have had the greatest job growth and highest earnings in recent times are those in which the employees have the most education. While an increasing number of college graduates are accepting non-college jobs, the returns to education have increased over time.

While changes in earnings may not accurately reflect changes in productivity, estimates of productivity generated by company-based production data suggest formal training has a substantial impact. Informal, on-the-job training appears to have a more limited effect on productivity than does formal training.

The authors note that variability in the ranking of the United States on a variety of different indicators of education and skill has added to debate regarding the degree to which definitive conclusions can be drawn from international comparative data. Critics argue that inadequacies in the sampling methods on which some of these indicators are based (involving poor response rates, lack of comparable populations, variability in sample quality, etc.) impede meaningful cross-country comparisons.

On the other hand, some people have argued that the United States lags behind other industrialised countries in workforce skills because of the relative scarcity of employer-provided training. On this view, the United States relies too heavily on informal learning-by-doing as its primary method of skills development, and underinvests in more rigorous forms of training.

Gregory, R 1995, *Higher education expansion and economic change*

According to Gregory (pp.34–5):

> *It is quite difficult to measure the changing skill requirements of the economy or the impact that increased supply of labour is likely to have on the pattern of job growth. The data presented here do not indicate a clear and consistent story. The impressions gained seem to be the following.*
>
> - *None of the skill metrics suggest that the Australian labour market is exhibiting a shortage of skilled labour.*
> - *It does not seem to be possible to make simple straightforward statements about demand and supply balances for broad skill categories, independent of the metric chosen to measure skill.*

- *The shortage of full-time jobs over the last two decades is unlikely to be the result of demand and supply changes for labour of different skills.*
- *The increasing education levels of the young have not protected them from bearing the major adjustment from the lack of job growth.*
- *There is clearly a lack of demand for young people of all education levels. Given the shortage of jobs, the labour market seems to be preferring people with more experience.*
- *Within the education and occupational classifications, it is likely that the earnings distributions have widened. As a result, there is not a tight mapping of changing employment patterns from one classification system into another. Analyses based on old job classifications are becoming less useful.*

. . . At this stage, it seems as though the labour market will continue to evolve in much the same way as in the past, with a strong bias towards part-time jobs and towards mature workers. Additional education has not been powerful enough to reverse these trends.

In other words, assessing the adequacy of the stock of VET skills is not a simple task. A variety of indicators, informing the judgement of knowledgeable people about specific situations, seem likely to yield better outcomes than relying on any one, universal 'metric'.

Indicators

OECD Centre for Educational Research and Innovation 1997, *Education at a glance: OECD indicators 1997*

Education is an investment in human skills that:

- can help foster economic growth and raise productivity
- can contribute to personal and social development
- has the potential to reduce social inequality

The new or enhanced OECD indicators presented in this volume allow for a better understanding of these outcomes in OECD countries, as well as of the costs of education, on the one hand, and of the benefits or returns to education, on the other.

OECD economies and labour markets are becoming increasingly dependent on a stable supply of well-educated workers to further their economic development and maintain their competitiveness. Because levels of skill tend to rise with levels of education, the costs of not working also rise. If labour markets are flexible enough to make use of the increased skill levels of individuals, higher levels of labour force participation should also be associated with higher levels of education. Higher levels of labour force participation can lower dependency ratios and help alleviate the burden of financing public pensions.

The indicators presented show how the demand for and supply of learning opportunities have evolved in OECD countries, and who the main beneficiaries of the public and private provision of education have been. It is also possible to use the indicators to look forward and to calculate the future implications of today's education system, for example, the rise in the number of adults who have attained educational qualifications at upper-secondary level or higher.

The relationship between educational attainment and skill levels is demonstrated, with indicators relating on-the-job training to occupational status and level of educational attainment. In a free labour market, the success of an education system manifests itself, among other ways, through the success of individuals in finding and holding jobs, as well as in the level of wages that employers are willing to pay for the skills individuals possess.

Other

OECD Centre for Educational Research and Innovation 1995, *Learning beyond schooling—new forms of supply and new demands*

This report treats the individual learner as the appropriate focus capturing demands for skill in the economy, and a range of evolving formal and informal learning mechanisms as the appropriate supply focus.

The authors see knowledge and learning as becoming increasingly central to work and everyday life. Both the desire and the opportunity exist to make conscious learning a pervasive part of every person's life.

Demand for learning comes from society and employers alike who see the economic importance of a better use of skills. Individuals also see the importance of learning in terms of both economic opportunities and the ability to function properly as citizens and consumers. The economic demand for learning is a key ingredient in job creation for a region.

New learning-supply mechanisms come not least from advances in information and communications technology. Governments, particularly in partnership with the private sector, have an important role to play in creating a sound infrastructure for learning, even when they are not directly involved as suppliers.

Policy strategies to promote learning beyond schooling are less straightforward than the introduction of a publicly financed school system. The pattern of learning beyond schooling is beyond the direct control of government, because these learning patterns are determined by a complex array of influences ranging from company attitudes to in-service training to local cultural attitudes towards informal study. Rather than being able to be determined by planned institutional 'provision', education and training activity is now influenced by a subtle and dynamic interplay between supply and demand, with individuals creating a demand for, as well as responding to, services offered at local, national and international levels.

The desire and propensity of individuals to engage in various learning activities can be measured as demand for learning. The provision of education and training programs, courses and packages that aid learning can be considered to be supply.

Rapid changes in supply and demand create the potential for a mismatch between the two. Provision of training and education cannot, in itself, create willing and effective participation; while potential or actual demand may go unmet until new supply mechanisms emerge.

Important conclusions from the report are that policy concerning VET skill provision should endeavour:

- to avoid excessively supply-led provision
- to ensure that courses and other learning opportunities are sensitive to the needs and desires of learners

This report underscores the appropriateness of a flexible approach to an assessment of the adequacy of VET skills and of supply responses to such assessments.

White, M 1992, '*The potential for guidance: Ideas from economics*'

Three main kinds of decisions are generally referred to in economic analyses of the labour market:

- decisions about whether to offer one's labour for work, and if so, for how many hours
- decisions about how much education and training to invest in (and of what sorts)
- decisions about which jobs to apply for and/or to accept

The second set of decisions can be called the human capital decision. According to the human capital theory, an individual invests in training in order to reap long-term returns. The need to consider the returns to training arises from recognition of the direct costs and foregone wages (or production) accompanying training. In many cases, qualifications open the way to better paid and/or more interesting careers. It is reasonable to suppose, therefore, that likely returns frequently motivate training.

To a large extent, human capital theory explains why gaining qualifications pays, but fails to predict under investment and over investment in training by many people.

The information required by individuals to make entirely rational decisions about training is enormous, and the impossibility of achieving such a level of knowledge provides a partial explanation of under investment.

Deficiencies of information, therefore, set limits to the efficiency of the labour market. It would be wrong to attribute all the failings of the labour market to problems of information, but specific problems of inadequately informed choices make a natural focus for consideration of the potential contribution of careers guidance.